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"In the discovery of truth, in the development of man's mental powers and privileges, each generation has its assigned part; and it is for us to endeavour to perform our portion of this perpetual task of our species."

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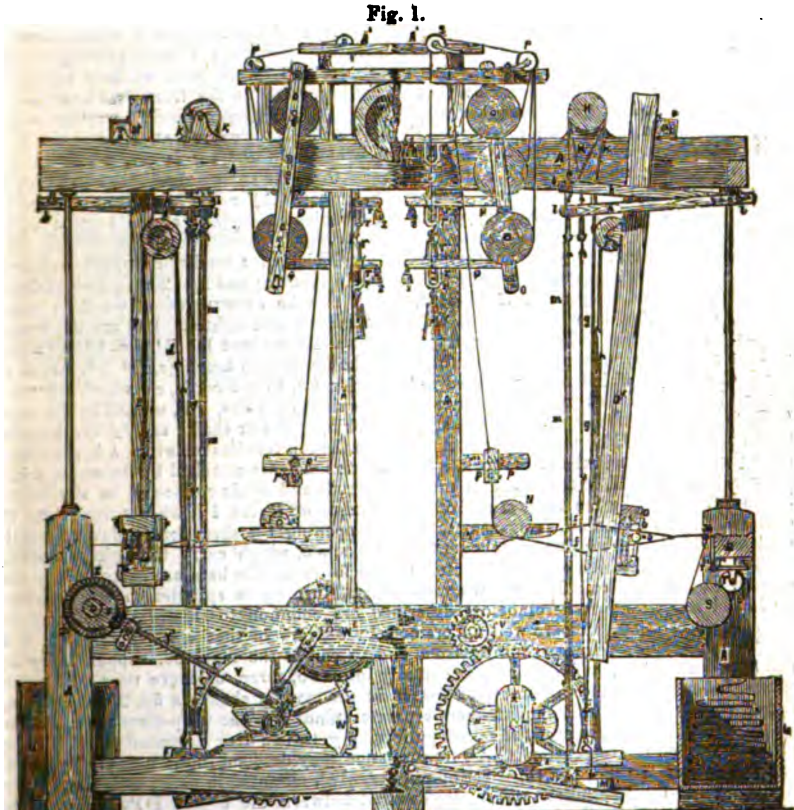
TATLOW AND HODGKINSON'S PATENT SMALLWARE LOOMS.

Fig. 1.



TATLOW AND HODGKINSON'S PATENT SMALLWARE LOOMS.

(Patent dated June 29, 1853.)

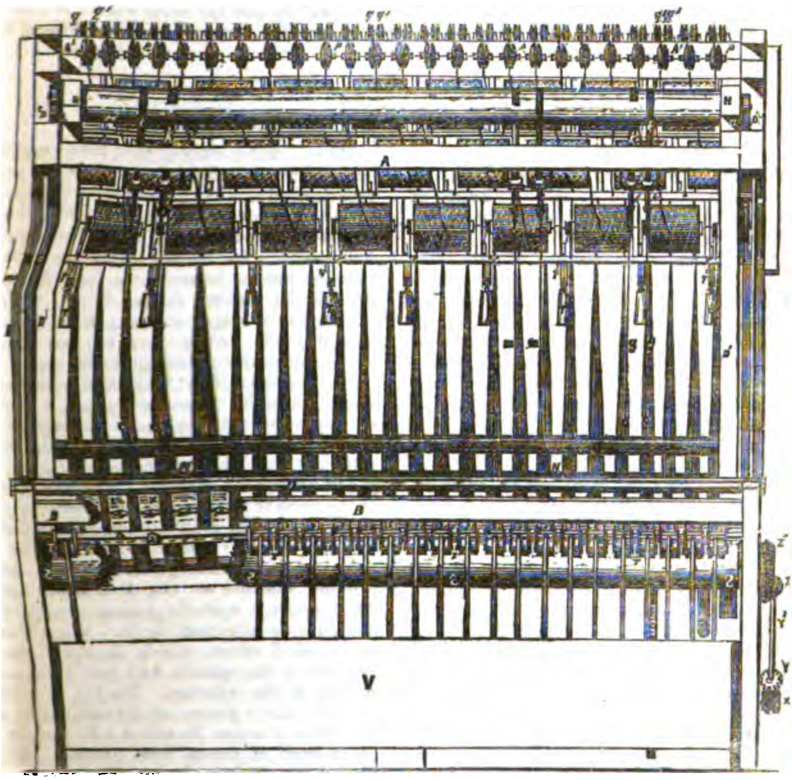
THIS invention has relation to smallware looms, or looms of the description employed for weaving all kinds of narrow work, either of silk, cotton, woollen, or linen yarns, such as ribbons, galloons, chintz lace, bed lace, carpet binding, tapes, and generally all goods of the smallware class.

The first improvement introduced by the patentees consists in constructing such looms with two or more lathes, back to back, in the same frame, whereby a great saving of space is effected. The second improvement relates to the giving off of the warp. In all self-acting smallware looms hitherto constructed, much inconvenience has arisen from the difficulty of giving off a regular and constant supply of warp from the warp-rollers; and in order to remedy this the patentees mount the warp-rollers in a frame fixed in the inside towards the front of the loom, and beneath the axis of each roller they place a weighted lever; they pass a cord from the lever over the axis of the warp-roller, and down to the back of the roller frame; the cord and lever act as a break upon the warp-roller, and prevent it from turning until the weighted lever is raised. The frame containing the warp is so constructed, that the lever acting on the warp-roller is immediately over the centre of the warp-pulley and weights, each weight being quite free, and without any string attached thereto. Each traverse of the shuttle raises the weight, frees the break, and allows a sufficient quantity of the warp to unwind itself from the roller. The third improvement relates to the taking up of the work. The fabric is caused, when woven, to be drawn off upon a receiving-roller, made to revolve by means of bevel gearing, worked by the power that drives the loom. The work does not wind itself entirely round the receiving-roller, but is taken off on a smaller roller placed at the front, and near the top thereof. The smaller roller exerts a pressure against the larger receiving-roller, and is supported in bearings from a lever, the fulcrum of which is in a rod attached to the lower part of the back of the breast-beam. The free end of the lever is pressed down by a weight or spring, which can be regulated so as to cause the smaller roller to exert the degree of pressure desired upon the receiving-roller. After the work passes over the smaller roller, it falls into a box, or other convenient receptacle at the bottom of the loom.

Fig. 1 of the accompanying engravings is an end view of a smallware loom constructed according to these improvements, one half being in section; and fig. 2 a front elevation of the same. A A is the general framework, which may be constructed of wood, as represented, or of iron, in which case it might be made much lighter. B B are the breast-beams. D D are the lathes which carry the weft-shuttles; and D^1 D^1 the lathe-swords, or beams, which are centred at *a a* at the top of the framing in bearings, D^2 D^2. E E are the jack-pulleys, which are connected to the jacks, *b b*, by the cords, *c c*, which are set in motion by the cords and rods, *d d*, connected to the shoot-treadles, F F, worked by the cams, G G, for throwing the shuttles. H H are the rocking-poles or shaft; and *f f* the handles, which are connected by the cords and rods, *g g*, to the top treadles or levers, *h h*, centred at *i i* to the upper part of the framework. These levers, *h h*, are attached by the cords, *k k*, to the rocking poles, H, and are set in motion by rods and cords connected to similar top levers, *l l*, worked by the rods, *m m*, from the treadles or levers, I I, when actuated by the cams, K K, on the main driving-shafts, L L, for opening the sheds for the passage of the shuttles. M M, are weights attached to the forks, *n n*, which carry the spindles of the pulleys, *o o*, round which cords connected to the lower heddle bars are passed for giving tension to the heddles. N N are the yarn rollers, turning in spindles in the brackets, N^1 N^1. The parts just hereinbefore described are common to smallware looms of the ordinary description, and are well understood by weavers of that class of fabrics. O O are "cratches," or frames, running from end to end of the machine, supported by the end framework, A A, and divided horizontally into two, three, or more tiers, and again subdivided vertically into a number of spaces in the manner shown in fig. 2, for carrying the warp-rollers, which are mounted on separate spindles. The warp-threads are carried up from the warp-rollers over the set of pulleys, *p p*, thence over a second set of pulleys, *q q*, mounted on the top castle, A^1 A^1, from whence they descend round weighted pulleys, *r r*, then return again over a third set of pulleys, q^1 q^1, mounted in pairs, with the pulleys, *q*, and on the same spindles, and finally descend between the combs, P P, and over the bars, P^1, supported in the brackets, P^2 P^2, and pass under the yarn-rollers, N N, to the heddles. Q Q are levers, centred at one end in the vertical divisions of the cratch-frame, and supporting at their other ends small weights, *s s*. *t t* are cords, attached at one end to the cratch-frame, which, after passing over the spindles of the warp-rollers, are

connected to the levers, Q Q. These cords act as a break upon the spindles of the warp-rollers, and thereby regulate the feed of the warp-threads as the work is formed, the weights, $s\,s$, being nearly in equilibrium with the weights, $r^1\ r^1$, suspended from the weighted-pulleys, $r\ r$, the latter having the slightest preponderance over the weights, $s\,s$. The stocks, $r^2\ r^2$, in which the pulleys, $r\ r$, turn, have at their upper portion two wires, $r^3\ r^3$, which embrace the levers, Q Q, and thereby preserve them in their proper and relative positions with respect to each other. The work as it is formed passes over the wires, $u\,u$, at the back

Fig. 2.



of the breast-beams; from whence it passes partially round the large receiving-rollers, S S, and then over the sets of rollers, T T; from whence it falls into the general receiving-boxes, U U. The rollers, T T, exert a degree of pressure upon the rollers, S, and upon the work passing between them by means of lever-brackets, I^1, which form the bearings for the spindles of the rollers, T T. The levers from which the brackets, I^1, depend, are centred upon pins in strips of wood, T^2, fixed to the back of the breast-beams; the other ends of the levers are acted upon by helical springs, T^3, placed between the levers and the underside of the breast-beams. Instead of springs, small weights may be used, if preferred. By this arrangement the work is gradually and regularly taken up as it is formed, and all tendency to slip, or to become doubled, is entirely obviated. The method of driving this machine is as follows:—V is a strap-pulley, turning in bearings in the top framing, A, of the machine. This pulley is driven by means of a strap from a steam engine, or other prime mover, and imparts motion to other pulleys on the same shaft, which are connected by belts, or straps, to similar pulleys on the shafts, L L. These shafts cause the sets of cams, G, and K, to rotate and act upon their respective treadles, or levers, and through them impart a semi-rotation to the jacks, b, whereby the

shuttles will be thrown, and the heddles will be alternately raised and lowered to open the sheds for the passage of the shuttles for laying the weft. W W, are spur-wheels, keyed upon the shafts, L L, and revolving with them. These spur-wheels gear into the pinions, W^1 W^1, which give motion to the shafts, W^2 W^2. Upon these shafts are keyed the fly-wheels, W^3 W^3, which have fixed in them eccentric pins, or cranks, *w*, and upon each of these is centred one end of the lathe-arms, W^4 W^4, while the other ends are connected to pins projecting from the lower ends of the lathe-swords, so that upon every revolution of the fly-wheels and cranks, the sleighs, *x*, at the back of the shuttles, are thrust forward and press up the work. X are endless screws, upon the outer extremities of the shafts, L L, which gear into, and impart motion to the worm-wheels, Y, on the inclined-shafts, y^1, the other ends of which carry bevel-pinions, Z, gearing into the bevel-wheels, Z^1, upon the axis of the receiving-rollers, S, and thereby impart the necessary motion to them for taking up the finished work.

ESCAPE-VALVE AND GOVERNOR.

The following paper, on an escape water-valve and a governor for marine steam engines, was lately read at the Institution of Mechanical Engineers, Birmingham, by Mr. Robert Waddell, of Liverpool.

The horizontal engine has of late years become a favourite engine in the British navy, for the screw steam ships have the advantage of being better protected from shot than the vertical engine, as the horizontal engine can be placed in the ship entirely under the water line; the boilers are also kept as much under the water-line as possible for the same purpose. All boilers are liable to prime, more or less, but when they are confined in the height of steam room they are more apt to do so, as in this case, and carry a considerable portion of water from the boilers into the cylinders along with the steam.

Water in the cylinders has, no doubt, been the cause of more accidents to engines than anything else, and many cases occur of the bottoms of cylinders being forced out, pistons broken, piston-rods bent, and side-levers broken,—all from the effects of water in the cylinder.

This can easily be accounted for, from the great power the one engine has over the other when water accumulates in the cylinder; the two engines being connected together in right angles, if a few inches of water has got into one cylinder, which will prevent the piston from getting to the end of its stroke, the opposite engine will be near half-stroke, at which point it gives out the greatest power, as the piston and crank are travelling near the same velocity, while the piston of the first engine, from the position of the crank, is nearly at a stand; then the power of the second engine, exerted to compress the water, will be in proportion to the difference of velocity of the two pistons, plus the momentum of the engine. The fly-wheel of the land engine acts on it in the same way when the engine is turning its centre.

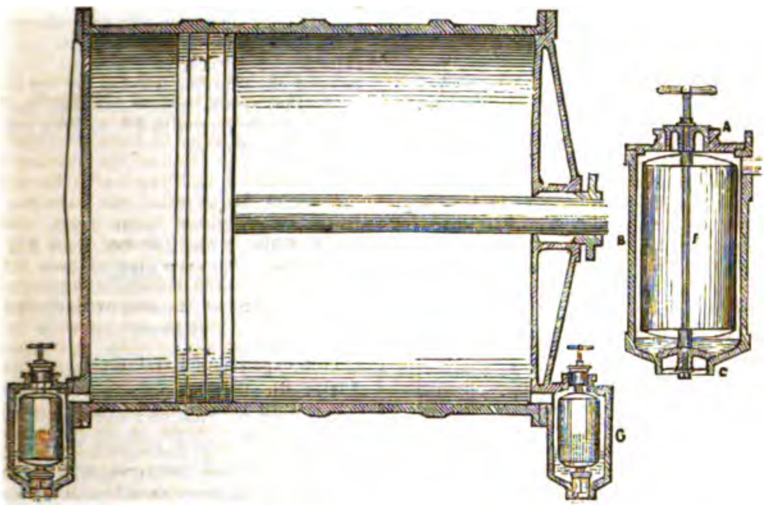
Escape water-valves have been applied on cylinders to take off the water, to prevent accidents taking place from the accumulation of water in them, but with little success. The fault of the ordinary escape water-valve is its being loaded like a safety-valve, so that no water can leave the cylinder till the piston forces it out, and then the strain is very severe, from the small area that the water has to pass through, which causes the damage to the engine.

The object of the improved escape-valve described in the present paper, is to draw the water off the cylinder throughout the stroke, and not allow it to accumulate, as with the ordinary escape-valves, till the piston strikes the water. The construction of the valve is shown in the accompanying engraving. Fig. 1 is a horizontal cylinder, with an escape water-valve attached to each end to the flange G; B is a small cylinder attached at G; F is a float inside the cylinder, a spindle passes through the float, and is attached to it. A and C are two conical valves nearly in equilibrium, attached to the spindle with nuts at top and bottom of the cylinder. The top valve, A, is made like a piston on the under side, so that when it leaves its seat it will prevent a great rush of steam from passing. It is also made slightly larger than the lower valve, C, so that the pressure of steam will assist in raising the valves, and a small accumulation of water about the float will open the valves; that is, suppose the float, valves, and spindle weigh 50 lbs. for the largest size of engine, and the pressure of steam in the boilers not to exceed 15 lbs. per square inch, and the top valve to be 3 inches more area than the bottom; then there will be 3 times $15=45$ lbs. excess of pressure on the upper valve, being within a few pounds of raising the valves, without any water about the float. The float should be made with sufficient buoyancy to raise the valves when there is no pressure of steam to assist.

It will be seen from the construction that when water enters the small cylinder from the steam cylinder, the float is buoyed up, opening the valves and allowing the water to escape through the bottom of the small cylinder. There is a hole in the spindle to carry off any water that might collect in the float.

The top valve is made larger than the bottom one to answer two purposes, namely, for the pressure of the steam to assist in raising them when a small quantity of water comes about the float; and, secondly, when a vacuum is formed in the cylinder the valves are kept shut by the atmospheric pressure being greater on the top valve than the bottom one; this will be the case if a great quantity of water enters the steam cylinder; the valves will then be kept open, running it off, until the exhaust takes place.

Fig. 1.



The engravings show an escape-valve suited to a 400-horse power engine, with 93-inch steam cylinder; the escape valves will then be about 6 inches diameter, and the float about 13 inches; this will give the float sufficient buoyancy to rise and open the valves before it is entirely covered with water, besides the assistance of the differential steam pressure on the valves.

A marine engine governor to check the admission of steam when the engine runs away from the water, leaving the wheels or screw, is much required. The ordinary governor has been tried for the purpose, but was found not to answer, as its action is too slow in shutting-off and letting-on steam; also the pitching and rolling of the ship in a heavy sea is very much against its action, and from these defects it has been abandoned.

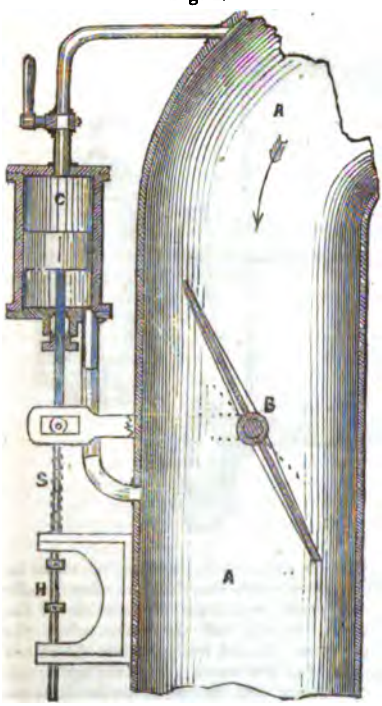
The ordinary method that is adopted at present, when the engines are racing in a heavy sea, from the water leaving the wheels or the screw, is for the engineer either to close the throttle-valve to the required extent, to prevent the racing, or stand by the engines, with the throttle-valve handle in his hand, watching the motion of the engines, to shut off the steam when the engine runs off, and let it on when the wheels take hold of the water. In a voyage across the Atlantic this has often to be done for several days, night and day; because closing the throttle-valve, and allowing the engines to go all the time throttled, when the wheels are in the water as well as out, diminishes the speed of the ship to a great extent. When the wheels leave the water, the steam that passes into the cylinders is lost, as the engines have nothing to absorb their power, besides the liability to break down the engines if they are allowed to race to any extent.

The governor described in the present paper can be used equally as well on land engines as on marine, where the work they are doing is not of a steady nature, such as driving a rolling-mill or a saw-mill, &c. When the saws leave the log, or the iron leaves the rolls, the engine has nothing to

absorb the power, and will run off before the ordinary governor will shut-off sufficient steam, its action being too slow for such sudden changes.

The proposed governor is shown in fig. 2, applied to the steam pipe to act upon the ordinary throttle-valve, or a separate valve may be fitted for it. A A is the steam pipe, and B, the throttle-valve; C is a small cylinder fitted with piston and rod,

Fig. 2.



and bolted to the steam pipe; the ends of the cylinder are connected to the steam pipe by two pipes, one above and the other below the throttle-valve. When the engine runs away, in consequence of the diminished resistance of the water, from the wheels or screw being out of the water, the pressure of the steam is also diminished by being wire drawn by the throttle-valve; consequently, on the upper side of the piston, we have the pressure the same as in the boilers, and on the under side the diminished pressure due to the sudden expansion of the steam, in flowing into the cylinders. The effect is to depress the piston, C, and shut off the steam from the engines, by partially closing the throttle-valve; but when the pressure becomes equal, or nearly so, on both sides, the piston is raised, and the valve opened by the spiral spring, S. The stops H on the lower end of the piston-rod can be adjusted by set screws, to allow the throttle-valve to be opened and closed to the required amount.

It will be seen by examining the governor, that when the throttle-valve is closed, it will remain so if time is not allowed for the space between the valve of the engine and the throttle-valve to get filled to the same pressure as above the valve, so that an equilibrium of pressure may take place on the piston; then the spring will open the valve; if the throttle-valve opens too soon, the stop H must be altered, to allow the throttle-valve to close further, so that the space between the throttle-valve and the engine-valve will take longer to fill, and the reverse if it opens too soon.

A NEW SYSTEM OF NAVAL WARFARE.

BY JAMES DUNBAR, ESQ., OF DORRERY, THURSO.

The expense of naval forces surpasses that of all other armaments necessary for the defence of a nation; and were it possible to reduce such expense without impairing their efficiency, it would prove highly advantageous to all countries possessing large navies, as the amount of revenue saved could be applied to more useful purposes.

During the last half century, several inventions have been proposed, and some attempts made, to effect the destruction of vessels of war by more rapid and less expensive means than by artillery. Those generally employed for this purpose consisted in the application of a quantity of gunpowder, enclosed in a case or shell, to the vessels below the surface of the water, which, on being exploded, would blow them to pieces. Mr. Fulton was the first that made any attempt of the kind with any degree of success. In 1801, he succeeded in blowing up an old brig in Brest Harbour, by means of a torpedo or shell placed under it by a submarine boat; but in another attempt, shortly afterwards, to destroy a British man-of-war, he entirely failed, it being impossible to fix the shell under it, because of the motion of the vessel. From the state of science at that period, the shells could only be ignited by clockwork; and

hence, unless they continued several minutes attached to the ship, to allow the boat to escape, their explosion would be of no effect. The impossibility of firing the shells at the moment of contact, without injuring the boat, was the principal cause of failure; but even if that could be effected, submarine boats were not well adapted to apply the shells, and could never do so unless in peculiarly favourable circumstances. Such vessels, however perfectly constructed, would have many defects; from the difficulty of obtaining fresh supplies of air, and other inconveniences, they could have but a small crew, and consequently could only be propelled at a very slow rate; when too near the surface they would be exposed to shot, and in danger of being crushed by steamers; when deeply immersed or in rough water, ships would be very indistinctly observed; and, lastly, they would require more depth of water than any other vessels, and could only proceed a short distance from land. These defects will always prevent submarine vessels from being employed in naval warfare.

The next invention was the catamarans used in the British expedition against the French flotilla in Boulogne Roads, on the night of October 2nd, 1804. This project was also a complete failure; not one of the catamarans could be placed alongside the vessels, and they all exploded without any effect, except the last, which accidentally destroyed an armed launch that passed near it. Again, on the night of December 8th, another attempt was made with two large catamarans, to destroy Fort Rouge pile battery, at the entrance of Calais Harbour; one of them could not be attached to the battery, and the other, when fixed, would not explode; which failure against an immovable object completely condemned the catamarans, and none of them were afterwards employed. The causes that led to the failure of the catamarans are sufficiently obvious; they had to be towed by common boats to the vessels intended to be destroyed, an operation which could only be executed during dark nights, as, should the ships observe them, they would instantaneously sink them; and even should they succeed in placing them secretly in contact with the vessels, they could not be exploded at the proper time, because the clockwork by which they were ignited required to run several minutes, to allow time for the boats to escape, and during that time they might move a short distance from the vessels, which would render their explosion of no effect. Besides this, the catamarans floated in the surface of the water, and consequently were as liable to be blown to pieces by the shot of any ship that perceived them approaching, as the boats employed in towing them.

Fire-ships and explosion-vessels have been occasionally employed, but with little success, it being generally found impossible to attach them to ships even when at anchor. The most remarkable attempt ever made with such vessels was that of the British against the French fleet, in Basque Roads, April 11th, 1809. On that occasion the British fleet was accompanied by twenty-one fire-ships and three explosion ones, the whole of which were directed upon the French fleet moored in the roads, and consisting of eleven ships of the line and four frigates. Upon the appearance of the fire-ships amongst them, the crews of the French fleet were seized with the utmost terror, and, in their consternation, cut or slipped their cables, and let the ships adrift, so that at midnight thirteen of them were aground. Next day, the British attacked the stranded ships, destroying three of them, two being also burnt by their own crews; thus making a total loss of five ships to the French. The result of the expedition, in regard to the fire and explosion-vessels, was therefore a complete failure,—not one of them did the least injury; and had the fleet stood at anchor, and sent boats to clear them away, it is probable that not a single ship would have been damaged: the terror of the crews was the sole cause of success. Although the largest of the explosion-ships contained 1,500 barrels of powder, it did not injure a frigate 120 yards distant, and had not sufficient power to break the boom nearly in contact with it. The small force of so large a quantity of powder was evidently owing to the defective manner in which it was arranged in the vessel; the utmost precaution being taken to direct the force of the explosion upwards, and to prevent its acting in horizontal directions, the only direction in which it could have any useful effect. Were fire-ships to be propelled by steam, so as to be independent of wind or tides, they would still be useless, because it would be impossible to attach them to ships without the inevitable loss of their crews.

On Captain Warner's invisible shells, no remarks can justly be made, their composition and the mode of applying them being still unknown. If, as he asserts, an 18-pound shell would sink a first-rate ship, the composition employed must be far superior in strength to gunpowder, and would be admirably adapted for submarine shells.

The most recent project is that of Mr. Nasmyth, the principle of which is to bring a large shell into direct contact with ships, by means of the collision of small steamers, having a large mortar fixed, under water, on

their prow, to contain the shell and to protect the stem from being damaged by the explosion. There can be no doubt but a small strongly-built steamer could in this manner apply a shell to the side of a ship sufficient to sink it; however, the shell being also in contact with the vessel applying it, and partly contained in the mortar, its explosion would produce a violent recoil and concussion, which would injure the crew and machinery; and even supposing that it did neither, still another shell could not be inserted in the mortar at sea by so small a crew as proposed; and there would be no possibility of the vessel defending itself from being boarded, either before or after applying its single shell.

The preceding are the principal projects that have been proposed for the improvement of naval warfare, all of which are inadequate to the purpose, and incapable of destroying war vessels in ordinary circumstances.

That a shell containing a suitable charge of powder will instantaneously destroy any ship, in contact with which it is exploded, and that more effectually than artillery, is a fact universally admitted, even by the most prejudiced opponents of naval improvement. The conditions necessary to the perfect success of employing shells are, that they be applied to ships at all times, and in all circumstances, without exposing those employed in the operation to more danger than in ordinary warfare; and that they be exploded at the precise moment required. Hitherto this could not be accomplished; but by the method now to be proposed these objects will be completely attained, rendering it practicable to apply the shells in all engagements that can occur. As the shells must necessarily be of large size, they must be applied below the surface of the water, both to preserve them from shot and to render their explosion more destructive to vessels.

The conditions most essential in the construction of a submarine shell are, that it be of the smallest possible size, consistent with the necessary charge of powder, and of such a form as to offer little resistance in passing through the water; that it be of the greatest possible strength, so as to increase the power and range of the explosion; that its depth below the surface of the water be such as to protect it from shot; and finally, that the gunpowder be perfectly preserved from water and all moisture. A small shell, of the weakest materials, and containing only a small quantity of powder, would destroy a first-rate ship, if exploded in close contact with it; but as this cannot invariably be done, the shells must contain a large charge of powder, and be of the greatest attainable strength, in order that their explosion may blow up any vessel at a short distance, without being in absolute contact with it. Cast-iron is not suitable for submarine shells, its cohesive strength not being much more than one-third of that of bronze or gun-metal; hence a shell of the latter would only weigh about one-third of that of a cast-iron one of the same strength and capacity. Shells could be built of malleable iron plates rivetted together, and these would be much stronger than cast-iron ones, and less expensive than brass: the latter, however, from its superior strength, is preferable.

(To be continued.)

ON INDUCTIVE ELECTRICAL MACHINES. BY M. FIZEAU.

The electrical machines which have been constructed of late years on the inductive principle are now well known; the constancy and regularity of their effects, as well as the facility of their employment, present marked advantages, which render these new machines preferable in some cases to those of the old construction.

Having undertaken some new experiments on the rapidity of the propagation of electricity, especially with the view of comparing in this respect electricity of tension with galvanic electricity, I found the employment of this apparatus very suitable for the purpose, but nevertheless that it would be useful to give greater power to the instrument, and especially to be able to increase the tension of the electricity furnished by it.

A very sensible increase of effect is obtained by employing a stronger pile to set the apparatus in action, and the electricity developed at the two poles of the machine acquires thus a very marked increase of tension. But this increase is accompanied by an inconvenience which deprives the instrument of its principal advantage, which consists in the regularity and the duration of its effects. One of the essential parts of the machine is M. de la Rive's vibratory contact-breaker. When the instrument is in action, very brilliant sparks are produced between the surfaces of the breaker, and although these surfaces may be formed of platinum, they are soon fused and destroyed when the current is rendered more intense: the vibrations becoming less constant in consequence, the production of electricity soon loses its regularity.

The same inconvenience would, no doubt, be produced by giving the machine larger dimensions than those adopted by M.

Ruhmkorff, for the force of the sparks which are produced at the point of vibration is due principally to the current induced in the conducting-wire itself; and if the dimensions of the wires and the number of turns of the spire be increased, this current would of course become more intense and the sparks stronger.

But an attentive study of the peculiarities of the apparatus soon led to the discovery of an entirely different and very simple means of increasing the energy of the effects produced. Many experiments, which it would take too long to describe, tend to show that the current of induction which is produced in the inducting-wire itself at the moment of the rupture of the circuit, exercises a considerable influence on the production of electricity in the induced wire which terminates the two poles of the machine. When this current is produced freely and takes a great development, the poles give but little electricity; but when, on the contrary, this current meets with obstacles, and only attains a slight development, the poles give much electricity, and the power of the machine becomes greater. Several arrangements served to prove this fact; I may mention the employment of metals more fusible than platinum on the surfaces of the breaker, and the union of the vibrating parts by fine wires of different lengths. This principle being admitted, it follows, that in order to increase the power of the machine, it is sufficient to oppose the development of the current which is produced in the inductor-wire at the moment of the rupture of the circuit; and it is easy to see that this result must be obtained by acting upon the tension possessed by this current and rendering it weaker. In fact, when the machine is in action, the great light of the sparks which appear at the point of rupture, indicates that the current in question acquires a great development; and this is the case because the electricity possesses sufficient tension to pass with facility the space which separates the vibrating pieces: if the tension became weaker, the space to be passed presenting a constant resistance, the passage would not take place with the same facility, the sparks would be less brilliant, and the current would acquire a smaller development.

A very efficacious mode of diminishing the tension is to have recourse to the well-known properties of the Leyden jar, and other apparatus founded on the same principle. A condenser is formed of two leaves of tin in juxtaposition, but separated and insulated from one another by a layer of varnish, and each of the leaves put into communication with each extremity of the inductive wire; the points of attachment must be on both sides of the point of interruption when the sparks are produced. Then the two electricities, before arriving at the point of interruption, spread over the two surfaces of the tin, where they lose their tension to a great extent, in consequence of the mutual influence exercised across the isolating layer of varnish.

When the condenser presents a sufficient surface (5 or 6 square decimetres), the light is seen immediately to become weakened at the point of interruption, whilst the machine acquires a remarkable increase of energy; the poles then give stronger sparks, and at a greater distance than before. The condenser may be conveniently placed in a horizontal position, a little above the electro-magnet, and sustained by four glass supports. With this addition, which is very easily made, not only does the machine give more electricity, but it also continues longer in regular action, because the surfaces of the breaker are no longer exposed to the action of the very intense sparks which change them so rapidly.

An arrangement invented by M. Sinsteden, in which the principle of condensation has been employed to obtain stronger discharges with inductive machines, has only an apparent analogy with the method which I here indicate; the principle and the effects of the two methods being, in reality, very different. In fact, it is the electricity developed in the second wire, the inductive wire, which is modified by M. Sinsteden, so as to cause more brilliant sparks; but here stronger discharges are not accompanied by an augmentation of tension, which is, on the contrary, weakened. The employment of this method does not in any way injure the efficiency of that proposed by me, and they may both be employed together where such a course is found advisable.

To furnish an idea of the increase of effect which I have obtained in my experiments, I will give the following observation:—A galvanometer being placed in the circuit, the electricity produced by the machine was passed in rarefied air, when the beautiful phenomena of light recently studied by M. Quet were produced. When the machine acted under ordinary conditions, the needle of the galvanometer indicated a deviation of 8°. When the condenser was employed, the light produced acquired greater splendour, and the deviation of the needle reached 15°, the intensity of the current being consequently nearly double.—*Philosophical Magazine.*

AERIAL TRAVELLING.

To the Editor of the Mechanics' Magazine.

SIR,—Your correspondent, "T. V.," in his communication on "the momentous question" of aerial travelling (vol. lix. page 509), having addressed himself somewhat pointedly to me, permit me to offer a few words in reply. It is peculiarly unfortunate that many persons are unable to consider the subject of aerial transit apart from terrestrial attributes, thereby investing the question with difficulties which do not necessarily belong to it.

"T. V." is evidently in a difficulty of this kind, when he proposes to settle the best form of aerial propeller by railway experiments on *terra firma!*

In arranging the several elements of aerial transit, they may be considered under four heads, viz.:—First, the form of vehicle. Secondly, the supporting agent, or flotative power. Thirdly, the best form of propeller; and, fourthly, the power by which the propeller is to be driven.

With reference to the form of vehicle, upon one point nearly all are agreed, viz., that the globular, or pear-shape, with its load suspended beneath, is wholly incapable of being propelled by any means whatever. As to the most eligible form, different inventors hold peculiar opinions; but some modification or arrangement of a cylindrical form is pretty generally preferred.

The supporting agent has long ago been agreed upon. Hydrogen gas is the best; carburetted hydrogen the cheapest and most easily obtained.

The best form of propelling and guiding apparatus, about which "T. V." "thinks so little has been said or thought," is a branch of the subject that has really received considerable attention; so much so, that it is pretty generally admitted that revolving vanes are the best, if not the only propeller available for aerial travelling. The sufficiency of the revolving vane, as a propeller, was very clearly and satisfactorily demonstrated some years ago at the Polytechnic Institution, by the veteran aeronaut, Mr. Green, whose varied experiments in the lecture-room of that institution were witnessed by thousands of spectators, and were, by many, considered conclusive on the subject. The same form of propelling apparatus acting upon the air, has been repeatedly applied to carriages on land, and to boats upon the water, with quite as much success as could be expected, when the great disparity between the elements of resistance is taken into account. The power of the vane propeller is very prettily illustrated by a toy that was at one time common, and was introduced in Mr. Green's experiments. This toy consisted of a vane-wheel in the upper part of a spindle, which could have a rapid rotation given to it by a string applied in the same way as in the ordinary humming-top. Rapid motion being thus given to the instrument, it rose quickly to the ceiling, spinning upon its apex, until the diminished velocity became insufficient for its support, when it descended. Let "T. V." no longer "think little has been said or thought as to the best form of propeller." On the contrary, the subject is one that has for years past engaged the attention of numberless individuals.

Finally, with reference to the power applicable to aerial travelling, considerable difference of opinion still prevails; many persons fondly cling to the hope that the power of steam, or some other equally efficacious agent, may eventually be pressed into this service. For my own part, however, I indulge in no such expectations, but am of opinion that the muscular power of the travellers is the only motive power that can possibly be made available in aerial locomotion. Nor do I see any more hardship in their thus "working their passage," than in a boat propelled by rowing.

I remain, Sir, yours respectfully,

WM. BADDELEY.

13, Angell-terrace, Islington, Dec. 27, 1853.

NEW THEORY OF ELECTRICITY.*

To the Editor of the Mechanics' Magazine.

SIR,—If you think the following theory worthy of a place in your valuable Magazine, perhaps its insertion would induce others to attempt an explanation of the mysteries of electricity and magnetism.

Electricity is the effect of the revolution of atoms of matter upon their axes. All matter is in motion, and the various forms which it assumes in organic and inorganic structures are dependent on the intensity and peculiarity of the motion of their constituent atoms. Atomic motion intensified is electricity, whether existing naturally or induced by artificial means.

That in electrical action one atom communicates its motion to those contiguous, and since, in travelling along a wire, this motion cannot be retrogressive, no continuous electrical current can be caused unless there be a reservoir at the negative end of the wire. The statement made in regard to the use of only one wire, that the earth completes the circuit home again, is incorrect, the fact being that the earth is made

* We have slightly altered the manuscript of this letter, in order to make the writer's diction more intelligible.—ED. M. M.

the reservoir for the motion excited in the battery; but as the electricity is not diffused so quickly in the earth as it would be at the negative metal, the current is not so intense with one wire as with two. By the revolution of particles of matter about their axes, a force is generated called magnetism; the revolution of masses of matter about their axes, generates a force exactly similar, called the attraction of gravitation; generally, therefore, the force caused by this kind of motion is one of compression, and the quicker the motion the greater the force, as may be seen by increasing the length of wire coiled round the soft iron magnet. When, however, the motion of the atoms or masses of matter is about contiguous atoms or masses, centrifugal force is generated, which is one of extension, and is directly opposed to the former.

Although, therefore, we only apply the term electricity to very intense atomic motion, it really belongs to all such motion, and its phenomena are as various as the conditions of organic and inorganic substances. And may we not infer that, in all living matter, the true state of health is that in which the opposing forces of extension and compression are in equilibrium, as is the case in planetary systems? and that disease and decay are the result of a disturbance of this equilibrium?

I think this would be a fair field for scientific investigation; for if the contraction and expansion of any substance is carried beyond its natural state, the destruction of the substance follows as a consequence. An illustration of this will be seen in the formation of gases from solids and liquids, and in other changes of condition, dependent on the relative intensity of the contractile and expansive forces generated by the atomic motion. Advantage is taken of this principle in welding iron: when the metal is heated to such a degree as to be on the point of changing its state from the extreme expansion of the atoms, the two parts are violently pressed together, and the atoms of one forced among the atoms of the other. Also, when steel or iron is heated until the atoms repel each other as far as possible, the sudden removal of the exciting cause allows the atoms to fall together with great force, and the metal becomes more dense and hard than if left to cool gradually.

Trusting that some of your correspondents will notice this subject, I am, Sir, yours, W. T.

A DYNAMICAL PROBLEM.

To the Editor of the Mechanics' Magazine.

SIR,—Having looked in vain through all the works on mechanics to which I have access for a solution of the following question, I will feel obliged by your inserting it in your valuable periodical, in the hope that some of your correspondents may be kind enough to answer it.

Let there be three balls of the same weight and material, and all homogeneous, with the exception of the loading, after mentioned. Let two of them be loaded, the loading constituting one-third of the *entire* weight of each, and let the loading of the one be at the centre, and its diameter be represented by one half, and let the loading of the other be equally distributed round the circumference. Finally, let the diameter of the unloaded ball be represented by three, and that of the others by two.

Required:

I. The comparative rate of motion at which they will travel when rolled.

1. Along a level.
2. Down an inclined plane of 45°.
3. Up an inclined plane of 45°. The impetus in each case being *a*.

II. What, as compared with each other, will be the distance to which they will travel when rolled.

1. Along a level.
2. Up an inclined plane of 45°. The impetus in each case being *a*.

I hope the question is made sufficiently intelligible.—I am, Sir, yours, &c.,

TYRO.

Edinburgh.

On Property in Designs and Inventions in the Arts and Manufactures. By THOMAS WEBSTER, M.A., F.R.S., Barrister-at-Law, &c., &c. London: Chapman and Hall.

THE appearance of this work, written by an author whose existing writings on the Law and Practice of Patents are so highly esteemed, affords us considerable pleasure. It is, perhaps, not very remarkable that persons should here and there be found who are averse to the practice of placing inventors under the protection of the Crown, as the owners of the inventions of which they are the authors. But it is certainly a fact, that all the arguments we have ever seen adduced in condemnation of the practice are nothing better than ingenious sophisms, sometimes of an attractive character, but always vitiated by the condition that, when applied to examples in which the property is of another character, they are proved in-

jurious to all natural rights, and subversive of all constitutional order. An ingenious and educated person would find but little difficulty in showing, to the perfect satisfaction of some, that many a royal prerogative, which natural feeling sanctions, and which experience has proved essential to national existence, is incompatible with the freedom and safety of the subject; and, indeed, nothing is more common than the occupation of ardent and uninstructed minds by fictions which, though harmless and pleasing when employed merely as the occasions of mental exercise, are of all things the most dangerous when they become embodied in the acts of a community, or are venerated as objects of popular admiration.

For these reasons we receive, with no common pleasure, the bold but scrupulous investigations of the fundamental laws by which property is regulated, given in the work by Mr. Webster. In commencing his treatise, he says:

"Property in the results of intellectual labour, whether copyright in music, literature, the fine arts and designs, or patent right in inventions in the arts and manufactures, has usually been regarded in its origin, rights, and protection, as presenting so many difficulties that the branch of jurisprudence relating thereto has been termed the metaphysics of the law. But it may be doubted whether this property, either in respect of its origin or of the principles on which it is founded, presents any difficulties not common to other species of property.

"Jurists and metaphysicians have advanced various, and in some respects inconsistent, opinions on the origin and rights of property; some treating the conception of property as an original notion inherent in the mind, others as evolved from a previous sense of justice, its protection and distribution being regarded as a matter of public policy to be provided for by the laws of each particular country.

"The idea or conception of property is antecedent to any notion of law; it is not the law of the land which constitutes the basis of property; neither does natural justice constitute property; justice is a virtue which presupposes property, and respects it, however constituted; justice, as a moral virtue, is not the creation of property, but the conformity of our actions to those views of property which vary in the various states of society. The universal recognition of and respect for property and the rights of its owner are not the results of the wisdom or authority of patriots and legislators deliberating on what was best for the good and order of the community, but the results of a prior wisdom employed in framing a constitution not for a state, but for human nature.

"The possessory feeling as the result of mere occupancy is common to our nature, and anterior to the application of any principle of natural justice or the sanction of positive laws. The feeling derived from occupancy acquires additional strength if labour has been bestowed by the individual on the subject of his occupancy, and is in accordance with a principle which is sometimes referred to as the natural right of property, namely, that every man is proprietor of the fruit of his own labour, and that to whatever extent he may have impressed additional value on any given thing by the work of his own hands, to that extent, at least, he should be held to be the owner of it.

"These two principles of ownership, by reason of occupancy or of the expenditure of individual labour, may be regarded as the origin of property. The feelings thus engendered are so natural and strong that the claim to the exclusive enjoyment of property is deferred to by others, and the occupant is allowed to remain in the secure and unmolested possession of that which he rightfully claims. The deference thus rendered to rightful claims gives rise to the sense of equity or natural justice prompting to likeness or equality between the treatment of others and the treatment claimed from others. So that if the sense of property be anterior to the sense of justice, and comes from an anterior and distinct source in our nature, the proprietary feeling in the heart of individuals does not originate from a sense of justice, which only arbitrates between the proprietary claims and feelings of different individuals after those feelings have arisen by the operation of other principles in the human constitution."

Further on he says:

"The principles to which property in literature, music, or the fine arts, or in a design or invention in the arts and manufactures, that is, property in the result of intellectual labour, must be referred, are the same as those to which other descriptions of property are referred, and the same sense of natural equity or justice acts as arbitrator between the antecedent or conflicting claims of proprietorship by different individuals. These principles being recognized, the laws of civilized states act as an auxiliary to ratify the constitution which the natural feelings and intellects of mankind had established, and perpetuate or

defend from violation the order of things which it had ratified. Property thus created and recognized is protected and regulated, as to its mode of enjoyment by the positive laws of each separate community.

"The origin and rights of property thus resting on the distinctive recognition given to occupancy and to the fruits of labour, the enjoyment of such property would naturally cease when the person who had so acquired it should no longer have any use for it. Hence it is said, by writers on natural laws and ethics, that by the natural law there would be no succession to property; that the child has no natural right to succeed to the property of a parent, and that a present occupant has no right to dispose of acquired property. Here, however, public policy steps in, and the laws of each country allowing of the disposition of such property by successive occupants, and defining the mode in which the property is to be enjoyed during the lifetime or after the decease of the first or successive occupants.

* * * *

"It is important that the true principles of the origin of property should be kept in mind, because a distinction has been supposed to exist between the original principles upon which property, as the result of manual or bodily skill and labour, and the result of the brain or intellectual labour, are founded, whereas if the preceding views be correct, the recognition of what is due to first occupancy and to proprietorship in the fruit of individual labour is equally applicable to the productions of physical and of mental labour.

"And this is the more important, because property in literature, or in designs, and invention in the arts and manufactures, has been supposed or represented to derive its origin from, and to have no foundation except the positive law of nations, or what may be termed municipal regulations. Without, however, entering further into a discussion of questions of so much difficulty and refinement, and on which writers of the greatest eminence on natural law and ethics are by no means agreed, the preceding may suffice to afford strong grounds for the opinion that the origin of all property is the same, being derived from the same general principles upon which the foundations of society rest, being in fact part of the constitution of man, of those principles which are the provision not of man but of God.

"As occupancy and possession have been referred to for the origin and rights of property, whatever admits of occupancy and possession may naturally be regarded as the subject of property; or to state the converse of the proposition, whatever can become the subject of property must admit of occupancy and possession, and the transmission of such occupancy and possession. Further, whatever does not admit of occupancy and possession, and is not capable of being transferred with an exclusive title, cannot be the subject of property."

Relic of William Cookworthy, Discoverer of the Cornish China-clay and Stone, about, A.D., 1755; *Founder of the British Porcelain Manufacture, about* 1760. Collected by John Prideaux, Member of the Plymouth Institution and Natural History Society, &c., &c. London: Messrs. Whittaker and Co. Plymouth and Devonport: Roger Lidstone.

This is an interesting little pamphlet, formed of biographical fragments, collected by a descendant of the worthy subject of the memoirs, and accompanied with suitable elucidations. It has been our custom, as our readers are aware, from time to time to notice the demise, or to recal the memory of those who, though in obscure positions, have helped to improve the arts or sciences, especially in our own land; and it would be our pleasure again to call attention to one who, by discovering the materials employed in forming porcelain ware, originated one of our most beautiful and admired manufactures. We have, however, only sufficient space at present to give an extract or two, which relate chiefly to the discovery itself.

It appears, that in 1745, an American brought Mr. Cookworthy specimens of China clay (kaolin), and China stone (petunze), and of porcelain made of these from Virginia.

"At this time much curiosity existed on this subject, by Count Reaumur's report, in 1729, on the materials of the Chinese porcelain, sent home by Father D'Entrecolles, which had originated the manufacture of Sevres; and by the accidental discovery of the like process at Dresden.

"This hint from the American may have set him on the investigation; for we find in Polwhele's 'History of Cornwall,' that among the burrows of a mine near Helstone, the late ingenious Mr. Cookworthy discovered a sort of earth which partly gave occasion to his porcelain manufactory at Plymouth. The substance had the distinguishing characters of the kaolin of China, which is described to be a white, unctuous, unvitrifiable earth; and is considered by the Chinese as the bones of Chinaware, or what gives it its firmness and consistency in the fire. The petunze, or vitrifiable ingre-

dient (says Mr. Cookworthy) which the Chinese consider as the flesh, since it gives the body transparency, softness of texture, and lustre in the breaking, was yet to be discovered. In his search after this, Mr. Cookworthy found a stone which would vitrify; but after some pretty extensive experiments, was satisfied it would not answer. This was a compound stone having a small mixture of limestone particles in it.

"Some time after this he perceived that our western granite or moorstone was of the genus of the stone he was inquiring after, as it was sufficiently vitrifiable. On giving a piece of this stone a white heat in a crucible, it melted; and the white parts of the stone were of a beautiful, glassy, semi-diaphanous white; but the black particles burning red, and containing iron, and being by any practicable art inseparable from the white part, it was plain the common moorstone would not answer, in so elegant a ware as the porcelain, where the perfection of the white is its merit and excellence. At length he discovered what he wanted near St. Austell.

"At the time of this discovery, we are told by Mr. R. Martin, of the St. Austell Blowing-house, he lodged in Carlogges, at St. Stephen's parish, and he has heard that he used to go about the country searching for minerals, and used to employ the 'Dowsing-rod.' It is reported that he first discovered it in St. Columb Church, or rather in the tower, which is built of stone from St. Stephen's. After having been worked for some time, it would appear to have been almost abandoned.

"The precise date of this first discovery is not given; but we find in 'Borlase,' that 'in 1758, Mr. Cookworthy, of Plymouth, had made experiments on the Breage china-stone, and that it had been found useful in the making of porcelain;' hence it was probably some years before that, not far from 1755. Nor have we any further distinct accounts of it till the establishment of the patent.

"The works were established at Coxside, and many specimens remain, exemplifying the gradual progress of the work, from fire-cracks, warping, bad colour, glaze in blotches from imperfect fusion, and painting run and tarnished, up to the purest white in body and glaze, the most delicate and exquisite painting, and the enamelling, and projecting shells, leaves and flowers, free from distortion on their thinnest edges. But details of this progress in the works, even traditionary, the compiler has been quite unable to obtain. They are said to have procured an excellent painter and enameller from Sevres; and Bone, the distinguished British enameller, is known to have served his apprenticeship there.

"The next account we have is from the 'History of the Staffordshire Potteries, Hanley, 1827,' collected, in great part, from the personal recollections of then aged potters. From this we learn:—'Mr. Cookworthy having discovered in what are now called the Cornish clay and Growan stone, similar materials to the kaolin and petunze, he first attempted the manufacture of porcelain, and being tolerably successful, he obtained a patent in 1768 for the exclusive use of these materials in the manufacture of porcelain and pottery. He afterwards sold the patent right to R. Champion, Esq., a respectable merchant in Bristol, who had been long employed in investigating the properties of porcelain. He erected a manufactory in that city, in which for some time he pursued his experiments, and ultimately succeeded in bringing them to a state of perfection, rivalling the Oriental productions; and although this is the first real English porcelain (for it has the essential property, being indestructible in both body and glaze), yet he expended a large fortune in erecting the various requisite premises; and after fully completing his scheme, was so unsuccessful in obtaining a demand adequate to the expenditure, that about 1777 he sold the patent to a company in Staffordshire.'

"From the same authority we also learn, that he first instituted in this country the manufacture of cobalt blue direct from the ore.

"'In the early process of blue painting, the colour was prepared by grinding foreign imported zaffres with muller and slab; but the demand increasing, we are informed that William Cookworthy, who had been a painter (of porcelain), and also a chemist and druggist, at Bristol happening to meet an old acquaintance, Roger Kenniston, also a painter, in very reduced circumstances, fully instructed him in the process of making a blue from zaffre, and also the whole recipe for extracting the pure metal from cobalt ores.'

"The progress of this art in Stafford and Worcester shires to the rank of one of the great manufactures of the country, and its competition with the finest works of Sevres and Dresden at the Great Exhibition, are known to all. But it is fair to our honoured townsman to say, that intrinsic excellence has been largely sacrificed to appearance and cheapness. Little, if any, of the modern British China is equal in texture to the latest old Plymouth and Bristol specimens now remaining.

"The manufacture has followed the fuel, but the clay and stone are still with us, and their joint products amounted last year to upwards of 100,000 tons, returning some-

thing like £150,000 a year to the industry of the adjoining counties—the benefits of his discovery, now seventy years after his decease."

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BOGGETT, WILLIAM, of St. Martin's-lane, Middlesex, gentleman, and GEORGE BROOKES PETTIT, of Lisle-street, gas-engineer. *Improvements in dioptric refractors.* Patent dated June 20, 1853. (No. 1503.)

The inventors claim the construction of triangular dioptric refractors of certain described forms, which are to be placed so as to throw down and disperse the light as required.

HODGSON, WILLIAM and HENRY, of Bradford, York, machine makers. *Improvements in machinery for spinning wool, hair, silk, flax, and other fibrous substances.* Patent dated June 20, 1853. (No. 1504.)

Claim.—An arrangement of mechanism for effecting certain movements of the spool rail; more especially a peculiar form of cam with gradually increasing inclines, arranged in a cycloidal form; and the use or employment of a vibrating shaft, as described.

PERKINS, JOHN WILLIAM, of Narrow-street, Limehouse, Middlesex, analytical chemist. *Improvements in the manufacture of artificial manure.* Patent dated June 20, 1853. (No. 1505.)

Claims.—1. Certain methods of producing superphosphate of lime, and the use and employment thereof in and for the manufacture of artificial manure, as described. 2. A mode "of manufacturing artificial manure, by producing superphosphate of lime compost direct, by the addition thereto of appatites, phosphorolites, coprolites, bones, bone-ash, or any one of them, or a combination of any two or more of such said matters or ingredients, and the combining therewith of soluble silica converted into silicate of soda or potass."

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *An improved manufacture of handles for knives and other similar articles.* (A communication.) Patent dated June 20, 1853. (No. 1507.)

Claim.—The combination, by means of casting, of a wooden core, with a metal frame provided with flanches or ribs to form recesses to receive ornamental inlaying.

CORNELIUS, RICHARD, of Old Town-street, Plymouth. *Improvements in the construction of churns for producing butter.* Patent dated June 20, 1853. (No. 1509.)

Claim.—Constructing or arranging the beaters of churns in such manner that water may be caused to flow through them.

GALLOWAY, ROBERT, of Cartmell, Lancaster. *Improvements in manufacturing and refining sugar.* Patent dated June 20, 1853. (No. 1510.)

The improvement in the manufacture of sugar consists in employing tannic acid (usually called tannin) or gallic acid, or a compound of one of these acids with a base, as potash or ammonia, in conjunction with the acetates of lead.

SKERTCHLY, JOSEPH, junior, of Kingsland, Middlesex, engineer. *Improvements in the application of baths to articles used for resting the human body.* Patent dated June 20, 1853. (No. 1512.)

Claim.—The adaptation of a bath to the space below the bottom or bedding of a bedstead, and also to the space below the seat of a couch or sofa.

GRIMAUD, PACIFIQUE, of Paris, gentleman. *A new ærogaseous drink, which he calls "Grimaudine."* Patent dated June 20, 1853. (No. 1513.)

This invention consists in preparing a drink of refined sugar, pure water, and dried sugar-cane—a gaseous fermentation being caused to take place.

BLATIN, HENRY, of Rue Bonaparte, Paris, France, gentleman. *Improvements in buckles.* Patent dated June 20, 1853. (No. 1514.)

Claim.—A peculiar construction of buckles, by which the tongue is made to fix and release the strap by means of a cranked axis and lever.

COWPER, CHARLES, of Southampton-buildings, Chancery-lane, Middlesex. *Improvements in the manufacture of cards, or substitute for cards, for the Jacquard loom.* (A communication.) Patent dated June 21, 1853. (No. 1515.)

This invention relates to the manufacture of the cards, or the substitutes for cards, mentioned above, of thin sheets of poplar, pine, or other similar soft woods, as free as possible from knots and shakes. The material is cut by means of a plane into thin sheets or shavings, which are immersed in water, or a weak solution of glue, and placed in a press. After being pressed for a short time, they are again dipped into another solution of glue, and passed between rollers or otherwise, to remove the excess of glue. A sheet of paper is laid on each side of the wood, and a number of pieces of wood so prepared are laid upon one another, and placed in a press, where they become partially dried; they are then taken out, and exposed to the air until dry. They are trimmed up to the required size by a circular saw, or otherwise, and they are afterwards punched or perforated with holes, ac-

cording to the pattern required, in a similar manner to that in which the ordinary cards are perforated.

GIRET, JUSTE, of Rue Papillon, Paris, France, gentleman. *Certain improvements in artificial and malleable stones, and in the apparatus to be used for such purposes.* Patent dated June 21, 1853. (No. 1519.)

This invention consists in manufacturing artificial and malleable stones from all kinds of sand, earth, stone, and metallic ore.

The inventor first submits these materials to the action of a strong heat in an oven of a peculiar form, and, when the substances are at the point of red heat, he pounds them in cast-iron or granite mortars, and reduces them to an impalpable powder. The substances thus reduced are then mixed with some fluxes, such as boracic acid, oxide of lead, potash, and soda, to obtain a more easy fusion, and placed in a melting oven, from whence the products of the fusion are precipitated in a vessel containing cold water, where they are transformed instantaneously into the form of natural coloured sand, the colouring of which may be more strongly determined by the addition of different metallic oxides when in the melting oven. The matters being thus cooled, are again triturated, pounded, and reduced into an impalpable powder, which is now placed in fire-clay moulds, and submitted to the action of the oven for the purpose of being solidified and taking the form of the mould. As the solidification of the powders thus moulded becomes complete, the moulds and their contents are withdrawn from the oven, and deposited in cooling vessels.

LEACH, JOHN, of Over Darwen, Lancaster, overlooker. *Improvements in looms for weaving.* Patent dated June 21, 1853. (No. 1520.)

Claims.—1. The application of apparatus for causing the sleigh at suitable intervals to carry with it the apparatus which has withdrawn the wire to an open part of the shed, in order that the said wire may be again inserted at that situation. 2. The use of an instrument bearing against the cloth as it is woven, and passing through the warp-threads when the weft is absent, so as to bring suitable parts into a position for causing the loom to be stopped.

NOONE, JOHN HENRY, of Salisbury-street, Portman-market, Middlesex, journeyman coach-builder. *An improved method of stopping railway trains, and preventing railway accidents.* Patent dated June 22, 1853. (No. 1521.)

Claim.—A new mode of stopping a railway train, by lifting the wheels off the rails, and allowing the carriage to rest on other wheels or supports which have no motion forward.

AYCKBOURN, FREDERICK, of Guildford-street, Russell-square, Middlesex, patent folding-boat manufacturer. *Improvements in rendering fabrics waterproof.* Patent dated June 22, 1853. (No. 1522.)

This invention consists in rendering woven, felted, looped, and other similar fabrics, and paper and leather, waterproof, by coating, or preparing the same with a solution or preparation of Indian-rubber, or with chouca marine glue, or other suitable cement, and then facing the surface with gutta percha, in the form of a paste, or in solution, or in a plastic state.

HUCKVALE, FRANCIS, of Choice-hill, near Chipping Norton, Oxford. *Improvements in hand-hoes.* Patent dated June 22, 1853. (No. 1523.)

The inventor describes and claims a method of constructing hand-hoes with two blades.

TOPHAM, CHARLES, of Hoxton, Middlesex, engineer. *Improvements in apparatus for measuring liquids, gases, and other elastic fluids, and for regulating the flow thereof, which apparatus may also be applied to the obtaining of motive power.* Patent dated June 22, 1853. (No. 1525.)

A full description of this invention formed the first article of our last Number.

CHASTAINGT, NOEL NATALIS DU, of Rue Rochechouart, Paris, France, chemist. *An improvement in bread-making.* Patent dated June 23, 1853. (No. 1527.)

Claim.—Constructing metallic plates or tins employed in making bread with galvanized iron wire or perforated sheet iron.

DODDS, THOMAS WEATHERBURN, of the Holmes Engine and Railway Works, Rotherham, York, engineer. *Improvements in the manufacture of files, rasps, and other edge tools usually made of steel.* Patent dated June 23, 1853. (No. 1530.)

This invention relates to the manufacture of the tools mentioned in the title from the crude or ordinary raw metal, as wrought iron or partially converted steel, the articles so shaped being subsequently hardened for use by placing them in a chamber containing a mixture of carbonaceous matter (as charcoal, by preference),—potash, pearlash, soda or soda-ash, or other alkaline matter,—limestone, and carbonate or bi-carbonate of lime, as marble-chippings, gypsum, oyster-shells, or other matter containing lime,—and any material which, being burned, forms animal charcoal.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *A new distilling-apparatus.* (A communication.) Patent dated June 23, 1853. (No. 1531.)

Claim.—The constructing distilling-apparatus for removing the saline properties from sea-water, and rendering it fit for drinking purposes, in which the heat employed is re-applied to the generation of steam or to culinary operations.

HORTON, JUN., JOSHUA, of Brierly-hill, Stafford, engineer and boiler manufacturer. *An improvement or improvements in steam boilers.* Patent dated June 24, 1853. (No. 1534.)

Claims.—1. Constructing steam boilers, in which the steam is generated either by the waste heat of a puddling-furnace or puddling furnaces, or by the heat of two or three furnaces, or fire-places, situated at right angles to one another.—2. A method of circulating the heated air of steam boilers and puddling-furnaces, through and around steam boilers.

ROCK, JUN., JOSEPH, of Birmingham, Warwick, factor. *An improvement or improvements in spring or clasp-knives, applicable to such other articles as shut or close, after the manner of clasp-knives.* Patent dated June 24, 1853. (No. 1535.)

Claim.—The introduction of a roller or rollers, or quadrant, or other portion of a roller, between the springs and tangs of clasp or spring-knives, and other such articles.

RICHARDSON, NOBLE CARR, of South Shields, Durham, founder. *An improved capstan.* Patent dated June 24, 1853. (No. 1536.)

This invention consists in manufacturing capstans with two separate barrels to work on the same deck, so constructed and arranged that either barrel can be worked independently of the other, or both barrels can be worked together.

SIDNEY, GEORGE SANDS, of the Willows, Brixton-road, Surrey, gentleman. *Improvements in jugs or vessels for containing liquids.* Patent dated June 24, 1853. (No. 1537.)

Claims.—1. The manufacture of jugs and such like vessels with windows, or transparent parts, to show the extent to which such vessels are filled with liquid; and, 2nd, the manufacture of jugs and such like vessels with estuaries for indicating when such vessels are filled to the proper extent.

JOHNSON, JOHN HENRY, of Lincoln's-Inn-fields, Middlesex, gentleman. *Improvements in the production or manufacture of flour.* (A communication.) Patent dated June 24, 1853. (No. 1541.)

Claims.—1. A general arrangement and construction of feeding and screening mechanism adapted for bolting, dressing, or other cleaning machines.—2. The application and use of one or more ribbed or plain cylinders for the purpose of regulating the feed, and preventing the entrance of foreign bodies into the bolting machine.—3. The application and use of a screen or sifter in the entrance to the bolting mill.

LYLE, JOHN, of Glasgow, Lanark, North Britain, manufacturer. *Improvements in the manufacture of figured or ornamental fabrics.* Patent dated June 24, 1853. (No. 1544.)

In manufacturing goods according to this invention, the different colours are measured off in separate lengths of weft, and these lengths are connected or tied together in a continuous piece, and the whole is then wound upon a reel as if the weft were one single-coloured piece. This chain of colours is made to correspond to the fabric in such manner that each increment of each coloured section shall form a certain defined length of colour in the woven fabric. The weft, so prepared, is now transferred to the shuttle in the usual form, and the weaving goes on entirely from this shuttle, each colour being woven into its destined position in the piece, just as if a separate shuttle had been used for it.

GOODALL, HENRY, of Derby, druggist. *Improved machinery or apparatus for grinding or levigating various substances.* Patent dated June 24, 1853. (No. 1545.)

Claim.—The employment for the purposes described of a vertical shaft or rod, secured or held at the upper end, and actuated by any convenient mechanical contrivance; and the application to a horizontal shaft or rod of duplicate cranks, eccentrics, or wheels, for the purpose of communicating to a vertical rod or shaft a rotary or compound rotary motion.

ILLINGWORTH, DAVID, ALFRED, and HENRY, of Bradford, York, worsted spinners. *Improvements in machinery or apparatus for combing wool, cotton, flax, silk, and other fibrous substances.* Patent dated June 25, 1853. (No. 1547.)

This invention relates,—1. To a process of combing wool, in which the material is held by a series of pointed instruments, from which a tuft or portion is taken by a moveable clamp or jaw, and from thence is transferred to travelling combs, to be subsequently drawn off by the revolution of rollers. According to this method the foremost holding points descend through the fibres within the tuft to be drawn off, leaving a projecting portion for the action of the clamp, in which portion a quantity of accumulated impurities is transferred to the travelling-combs. The object of this part of the invention is to cleanse the whole of the tuft, and this is effected by causing certain of the holding instruments to pass through, so as to comb out that projecting portion thereof which is ordinarily left in front of the faller; or, instead of this arrangement, an additional combing apparatus is employed, which operates upon the said

projecting fibres previously to the clamp closing therein:—and 2. To a method of combining the usual holding-points and tuft-detaching apparatus with a "gill" or other receiver travelling in the direction of the length of the fibres laid thereon.

ANDRAUD, ANTOINE, of Paris, civil engineer. *Certain improvements in railways and locomotives running thereon, which improvements facilitate the ascension of steep inclines.* Patent dated June 25, 1853. (No. 1548.)

Claims. — 1. "The widened and partly straightened felloes or periphery of the driving-wheels, for running on ordinary rails, and on a counter rail of wood, or any other suitable material, placed parallel to one another, or certain parts of the way."—2. A triple evaporation, described.

LIGHTFOOT, JOHN EMANUEL, of Accrington. *An improvement in the manufacture of certain colouring matter to be used in dyeing and printing.* Patent dated June 25, 1853. (No. 1549.)

Claim.—The manufacture of garaneine from waste or spent madder liquor, by first filtering, and then peculiarly treating the same; and treating such waste or spent madder liquor as explained, without separating the spent madder grains from it by filtration; and also the employment of close covered wooden vessels or cisterns.

SANDOZ, ALFRED, of the firm of Sandoz, Brothers, of Ponts, Switzerland. *An instrument or apparatus, which he terms a solar watch.* (A communication from the inventor, Philipe Henri Matthey Doret, of Locle, Switzerland.) Patent dated June 24, 1853. (No. 1551.)

Claim.—An instrument or apparatus in which the shadow cast from a thread upon a dial is made to indicate the hour of the day.

HARLOW, ROBERT, of Stockport, Lancaster, brass-founder. *Improvements in constructing and working valves for baths, washstands, and other purposes.* Patent dated June 27, 1853. (No. 1552.)

This invention consists, 1. In the application of tubes made of vulcanised India rubber, or other elastic material, to the spindles of valves, in order to dispense with stuffing-boxes. And, 2. In a new combination of parts for working the valves of baths, washstands, and other purposes.

RICHARD ARCHIBALD BROOMAN, of the firm of Robertson, Brooman, and Co., of Fleet-street, London, patent agent. *Improvements in printing, or in producing designs and patterns on stuffs and fabrics.* Patent dated June 27, 1853. (No. 1553.)

A full description of this invention will be given in a future Number.

FAIRCLOUGH, WILLIAM, of Stockport, Lancaster, machine-smith. *Certain improvements in looms for weaving.* Patent dated June 27, 1853. (No. 1554.)

Claims.—1. A novel application of the fork in combination with a projecting or fixed catch and spring attached to the ordinary spring of the swell, for the purpose of stopping the operation of power-looms by the means described. 2. The covering the surface of the "taking up" roller with wire cards.

MASON, JOHN, of Rochdale, Lancaster, machinist, and LUKE RYDER, of the same place, mechanic. *Improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.* Patent dated June 27, 1853. (No. 1555.)

This invention relates,—1. To the lapping machine, and consists in causing the web of material to be delivered to the lap-roller, at a point beyond that at which it runs in contact with the first lapping-drum, or that which is nearest to the feeding end of the machine. Another point of novelty consists in the adaptation of revolving apparatus for effecting a positive amount of resistance to the winding on of the web, so as to effect a required compression during the increasing diameter of the lap. 2. To the condenser carding-engine, and consists in an arrangement for removing such slivers as pass through the engine, with spaces between them. The doffer is covered with fillet carots from end to end, and from this the slivers are removed by means of two or more strippers provided with rings of cards, the aggregate number of which corresponds to the number of slivers passing over the carding-cylinder. The inventors also describe improvements relating to condenser carding-engines, to intermediate carding-engines, &c., &c.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for drilling or boring rocks, or other hard substances.* (A communication.) Patent dated June 20, 1853. (No. 1506.)

The object of this invention is to construct and arrange the several parts of a machine for drilling rocks in such a manner that the drill may be made to act either vertically, horizontally, or at any angle required, according to the peculiar circumstances of the case.

DEFEVER, CHARLES LOUIS, of Steenbrugge lez Bruges, Belgium, merchant. *An improved preparation for lubricating machinery.* Patent dated June 20, 1853. (No. 1508.)

This preparation is composed principally of colza, oil, and caoutchouc, which is dissolved therein by being submitted to a great heat. The oil is heated in a suitable vessel to the required temperature, and when the caoutchouc is added, it will in a short time be completely dissolved; after which, while the mixture is still hot, it must be filtered so as to remove the impurities; the preparation will then be fit for use.

MACPHERSON, ALLAN, of Brussels, Belgium, merchant. *Improvements in disinfecting sewers or other drains, and in converting the contents thereof to useful purposes.* Patent dated June 20, 1853. (No. 1511.)

The inventor proposes to use peat or peat-charcoal, mixed with chloride of sodium, or alone, where it may be found desirable; but in all cases where manure is of value, and can be disposed of with facility, he mixes the peat or peat-charcoal with the chloride of sodium, powdered, to add to the fertilizing properties of sewage to be received in reservoirs.

NEWTON, JOSEPH, of Ickwell, Bedford, horticulturalist. *Improved apparatus for heating buildings, applicable also to horticultural purposes, and to hatching and rearing poultry and game.* Patent dated June 21, 1853. (No. 1516.)

This invention consists,—1. In a new mode of arranging and combining together certain parts so as to constitute a hot water apparatus, which may either be fixed or portable. 2. In a new mode of arranging and disposing flues and pipes in connection with the said hot water apparatus, to be employed as conduits for heated air. 3. In the use and application of balance thermometers, in combination with such said apparatus and flues, for the purpose of regulating the degree of heat to which it may be required to warm or rarify the air admitted into a building, so as to maintain a regular and uniform temperature therein.

WILSON, THOMAS, of Manchester, corn-factor and miller. *Improvements in screens, or machinery for cleaning wheat and other grain.* Patent dated June 21, 1853. (No. 1517.)

A peculiarity of this invention consists in employing a vacuum, or partial vacuum, which, by causing a current of air to proceed from the screen, will assist gravity and the centrifugal action of a drum in the separation of the dirt, chaff, and foreign matters from the grain. The screen or grating employed is of a conical form, or of a form approaching to that, its axis being placed perpendicular.

DRUMMOND, JOHN, of Edinburgh, Scotland, mechanic. *A reaping machine.* Patent dated June 21, 1853. (No. 1518.)

This invention consists of a simple framework, mounted on two wheels, similar to a single horse cart, with the exception that the axle is made moveable with the wheels, an upright or vertical shaft being attached to the back or hindermost part of the framework, to which the cutter or cutters are attached, with a moveable joint and pin, so as to enable it to be adapted to every kind of surface, and thus cut the crop at any height. Motion is communicated to the shaft and cutters from the axle and driving wheels.

GEEVES, WILLIAM, of the Caledonian Mills, New Wharf-road, Caledonian-road, Middlesex. *Improvements in the manufacture of bricks.* Patent dated June 22, 1853. (No. 1524.)

This invention consists in constructing a carriage to run on a railway, the carriage being of a rectangular form, and of a depth somewhat more than equal to that of the bricks to be made. Into the bottom of this carriage, pallets or boards, each of the width of a brick, are to be placed, and when perforated bricks are to be made, these pallets or boards are to have as many upright pins or projections as there are perforations required. The bottom of the carriage being covered with such pallets or boards, the brick earth is to be filled and pressed into it, so as to fill all parts, and the excess is to be removed by the carriage moving under suitable cutters or scrapers, and the brick earth is afterwards to be cut longitudinally and transversely into portions, of the size of bricks, by other cutters.

STOCKS, GEORGE LOUIS, of Limehouse-hole, Poplar, Middlesex, ship-chandler, and THOMAS WATSON, of Buttesland-street, Hoxton, rose-engine turner. *Improvements in the construction of ships' square sails, and in the method of reefing the same.* Patent dated June 23, 1853. (No. 1526.)

In this invention a roller is suspended from the lower fore-quarter of the yard at each end thereof, and one also in the centre, and at each end of the roller is a metal worm travelling in a contrary direction to a fair leader on the said worm. The sail is attached to the roller by a jack-stay, and a triangular portion of the centre of the sail is cut out, and the vacant space thus made in the sail is filled up by a distinct triangular sail, which is to be called the centre sail. Ropes or chains are attached to the edges of this triangular sail, and also to those edges of the main-sail, which adjoin those of the triangular sail, and these ropes or chains lead to the deck abaft the sail. On the chains or ropes, clamps or grooves travel, suspended from the roller through which the chains or ropes travel upwards with the sail to the roller. The

centre sail remains stationary until the main body of the sail is reefed, when it may be reefed to a yard to which it is attached.

BURROWS, JAMES, of Haigh Foundry, near Wigan, Lancaster, engineer. *Certain improvements in the construction of steam boilers or generators, and in the arrangement of furnaces connected therewith.* Patent dated June 23, 1853. (No. 1528.)

The first part of these improvements consists in constructing or forming boilers or generators of metallic plates, the ends or sides whereof are swelled or formed thicker than the body of the same, in order to compensate for the loss of strength otherwise occasioned, by punching or forming the rivet-holes in the said plates. The second part consists in forming the internal flues or other heating surfaces of such boilers or generators of waved or corrugated metal, in order to give thereto the maximum amount of strength to resist compression, with the minimum amount of weight; and also to afford an increased surface for the radiation of heat and consequent generation of steam. The corrugations also cause an undulatory movement among the gases, &c., thereby effecting a more rapid absorption of heat therefrom. The corrugations may be formed either in a circular or in a longitudinal direction. And the third part consists in placing in the interior of the said internal flue or flues a core or distributor, for the purpose of disseminating or distributing the gases more equally over the interior surface of the flue or flues.

BURROWS, JAMES, of Haigh Foundry, near Wigan, Lancaster, engineer. *Certain improvements in the formation of such metallic plates as are required to be conjoined by riveting or other similar fastening.* Patent dated June 23, 1853. (No. 1529.)

This invention applies chiefly to the formation of what are technically termed "lap-joints," and consists in rolling or otherwise forming the sides or ends, or both the sides and ends, or other parts of such plates (where the rivet or other holes are to be punched or otherwise formed) thicker or stronger in substance than the body of the plate, in order that when the said rivet or other holes are formed that part of the plate shall remain as strong and as capable of resistance to pressure or other force as any other part.

ASPINALL, JOSEPH, of Old Hall-street, Liverpool, broker. *A self-adjusting stamp.* (A communication.) Patent dated June 23, 1853. (No. 1532.)

The handle of this stamp, in lieu of being immovably fixed upon the die, has a ball at its extremity, which is allowed to work in a corresponding socket, fixed on the top of the die. By these means it is evident that the die will always lie flat upon the surface of the paper to be stamped, although the direction of the pressure communicated by the handle may not be directly vertical, as essential in the ordinary stamps.

COOKE, MASTA JOCELIN, of the Tyne Manure and Chemical Works, Glasshouse-quay, Newcastle-on-Tyne, gentleman. *An improved mill and apparatus for crushing and grinding bones, grain, and other compounds.* Patent dated June 23, 1853. (No. 1533.)

The chief peculiarity of this mill is an arrangement of the cutters, by which when the mill drives the substance to be ground, after it has been roughly crushed at the throat-cutter against the grooves of a cutter-plate, it is further reduced, and ultimately falls down on a male conical cutter, between which and a female cutter it is ultimately reduced to powder, or to small pieces according to the set of the mill.

WEBSTER, JOHN, of Ipswich. *Improvements in the distillation of fatty and oily matters.* Patent dated June 24, 1853. (No. 1538.)

This invention consists in the distillation of fatty and oily matters, by means of a double vessel with an intervening atmosphere or current of heated air, and in the introduction of a stirrer or agitator for mixing fatty and oily matters with any agent or agents in or during the process of distillation. And also in the passing of a current of steam or any other vapour through fatty and oily matters submitted to distillation.

JOHNSON, JOHN HENRY, of Lincoln's-inn Fields, Middlesex, gentleman. *Improvements in obtaining motive power.* (A communication from MM. Guichené and Burgalat.) Patent dated June 24, 1853. (No. 1540.)

This invention relates to an arrangement of mechanism consisting of a combination of levers, springs, and pulleys, so combined, says the inventor, as to produce, when set in motion, a motive power or prime mover. The machine consists of a revolving disc fitted with a series of levers working horizontally. These levers are graduated in length, the shorter ones being situated near the centre of the machine, and the long ones towards the circumference of the disc; they are each connected by a series of rods which transmit the movement from one lever to another throughout the series.

JOHNSON, JOHN HENRY, of Lincoln's-inn Fields, Middlesex, gentleman. *Improvements in machinery or apparatus for cutting paper and similar materials.* (A communication from M. Pfeiffer.) Patent dated June 24, 1853. No. 1542.)

In order to give the plain cut to the sheets of paper, or leaves of the book to be bound, the inventor arranges them in the

following manner:—Several volumes are placed one on the other, with the loose backs in their proper places in the pile. The opposite edge of the sheets or leaves and backs to that about to be cut is placed in contact with a gauge attached to the supporting table. This gauge is fitted on its face with horizontal strips of wood or metal, which project from its face a certain distance, corresponding to the required overlap of the backs of the book beyond the leaves. The backs are placed between the strips, and the leaves against the face of the strips, therefore the one will overlap the other. The mass thus arranged is now pressed together by tightening screws in a suitable frame, and the cut is formed by a knife which traverses obliquely, being actuated by a screw set at an angle with the cutting edge, which may or may not be horizontal.

McConnell, James, of Hazeldean, Renfrew, North Britain, bleacher. *Improvements in the consumption or prevention of smoke.* Patent dated June 24, 1853. (No. 1542.)

This invention consists in so arranging furnaces and fireplaces, and their flues, that the smoke may be entirely or nearly consumed, whilst the fuel is greatly economised. This is accomplished by passing a gas pipe into some part of the flues, in such way that a steady gas-flame may be kept up at the required point, and as the unconsumed gases come forward on their route to the chimney, they are consumed by being passed through the flame.

Valls, Leon, of Paris, France, merchant. *Improvements in the production of printing surfaces.* (A communication.) Patent dated June 24, 1853. (No. 1546.)

The object of this invention is to produce surfaces which may be employed for various printing purposes, such as for printing calico, or textile tissues or fabrics, paper-hangings, and for other purposes to which wooden or metal blocks are usually applied. The material to be used in place of those usually employed for printing surfaces is gutta percha, either alone or in combination with caoutchouc or other ingredients.

Mackelcan, George Josiah, of Lechlade, Gloucester, agricultural implement maker. *Improvements in winnowing or corn-dressing machines.* Patent dated June 25, 1853. (No. 1550.)

This invention consists in combining a series of sieves of varying degrees of fineness with ordinary winnowing apparatus.

Newton, Alfred Vincent, of Chancery-lane, Middlesex, mechanical draughtsman. *Improved apparatus for manufacturing resin-oil.* (A communication.) Patent dated June 27, 1853. (No. 1556.)

This improvement relates to the employment of an arrangement of serpentine pipes connected with coolers, whereby the oil is discharged during the process of distillation, and separated from the other products of distillation. The serpentine pipe leads off from a cast-iron still, which is supplied with resin by a pipe leading from a resin reservoir, and extending to near the bottom of the still, and is connected at different parts of its length with small coolers containing worms, and at its extremity with the worm of a large cooler.

French, George, of Bandon, Ireland. *Improvements in axles or axletrees.* Patent dated June 27, 1853. (No. 1557.)

The object of this invention (which is particularly intended to be applied to railway carriages) is, to so construct the axles or axletrees of such carriages that the wheels, when keyed or fastened thereon, may be allowed to turn independent of each other when required, as when running round curves or into sidings. This object is effected by dividing the axle or axletree into two parts, or half axles, and causing the end of one half axle to be bored out so as to form a socket, and the end of the other half axle has a pin formed thereon, which fits into the socket of the other. The two parts are secured and held together by flanges or collars, which are secured together by bolts.

PROVISIONAL PROTECTIONS.

Dated October 18, 1853.

2404. Emory Rider, of Coleman-street, London, manufacturer. Improvements in the manufacture or treatment of gutta percha, being improvements upon the invention secured to him by letters patent dated the 20th day of July, 1852. Partly a communication.

Dated October 25, 1853.

2456. Christopher Richard Norris Palmer, of Amwell, Hertford, Esq. An improved mode and apparatus for preventing accidents on railways (including improvements in signalising apparatus.)

2462. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improved construction of railroad carriage-axle. A communication.

Dated November 5, 1853.

2576. James Barlow, of Bolton-le-Moors, Lancaster, manufacturer, and Thomas Settle, of the same place, manager. Certain improvements in power looms for weaving.

Dated November 17, 1853.

2667. William Underwood, of Handsworth, Staffordshire. Improvements in cooking-stoves.

Dated November 25, 1853.

2741. Alexandre André Victor Sarrazin de Montferrier, of Paris, France, gentleman. Improvements in wheels for vehicles on common roads and railways.

Dated December 8, 1853.

2847. Thomas Moran, of Dublin, druggist. An improved means or apparatus for the prevention of accidents on railways in certain cases.

Dated December 9, 1853.

2859. Pierre Marie Fouque, civil engineer, Louis Réné Hébert, and Vincent Etienne Doret le Marneur, of Paris, France. Improvements in rudders.

2868. John Chisholm, of Holloway, Middlesex, practical chemist. Improvements in the distillation of organic substances, and in obtaining products therefrom.

Dated December 10, 1853.

2879. Hippolyte Laurent Du Bost, of Rue Neuve des Petits Champs, Paris. Improvements in the construction of locks and keys.

Dated December 14, 1853.

2895. Philip Grant, of Manchester, Lancaster, letter-press printer and stationer. Improvements in printing-presses.

2897. John Ambrose Coffey, of Providence-row, Finsbury, Middlesex, pharmaceutical engineer. An improved method of evaporating liquids.

2899. John Zuill Kay, of Dundee, Forfar, gas-engineer. Improvements in gas-meters.

2901. John Wibberley, of Eagley, near Bolton, Lancaster, mechanic. Certain improvements in machinery or apparatus for winding yarns or threads on to spools or bobbins.

2903. Robert Parrock, of Glasgow, Lanark, North Britain, tailor. Improvements in coats and similar articles of dress.

Dated December 15, 1853.

2905. Eugéne Hippolyte Rascol, of Catherine-street, Strand, Middlesex, gentleman. Improvements in retorts for the manufacture of gas. A communication.

2906. Samuel Messenger, of Birmingham, Warwick, manufacturer. An improvement or improvements in railway, ship, and carriage-lamps.

2907. Thomas Pugh and William Kennard, both of King-street, Snow-hill, London, ironmongers. Improvements in lock and latch-spindles.

2908. Joseph Bennett Howell, of Sheffield, York, steel-manufacturer, and John Shortridge, also of Sheffield, York, gentleman. An improvement or improvements in the helves of tilt-hammers.

2909. Jacques Pierre Henri Vivien, manufacturer, of Paris, France. Certain improvements in the manufacture of paper and pasteboard.

2910. Auguste Edouard Loradoux Bellford, of Castle-street, London. An improvement in blasting powder for mining, and other operations of a similar nature. A communication.

2912. Jean Baptiste Pascal, of Lyons, France. Certain improvements in obtaining motive power.

2913. Frederick William Branston, of Oak-tree-house, Clapham, Surrey. Improvements in certain tablets, labels, and signs, or their surfaces exhibiting letters and designs.

2914. Charles John Morris, of Kirby-street, Hatton-garden. Certain improvements in bookbinding.

2915. Benjamin Whitaker, of Brighton, Sussex, engineer and machinist. Improvements in the manufacture or production of useful toys.

2916. Alexander Cochran, of Kirkton Bleach Works, Renfrew, bleacher. Improvements in the application of starch or other substances of a similar nature to woven fabrics, and in the machinery or apparatus employed therein.

2917. Ferdinand Denis Gibory, of Paris, France. Improvements in instruments for ascertaining heights and distances and for levelling.

2918. Arthur Benjamin Samuel Redford, of Albion-place, Walworth-road, Surrey, printer, and Thomas Cloake, of Saville-row, Walworth-road, same county, watch-maker. Improvements in retarding and stopping the progress of railway carriages.

Dated December 16, 1853.

2919. William Binnion, of Birmingham, Warwick, manufacturer. Improvements in carriage and other lamps.

2920. Walter George Whitehead, of Birmingham, Warwick, accountant clerk. An improvement or improvements in hats, caps, bonnets, and other coverings for the head.

2921. William Tranter, of Birmingham, Warwick, gun-maker. Certain improvements in fire-arms, and in bullets and waddings to be used therewith.

2922. Antoine Limousin, weaver, of Paris, France. Improvements in looms for weaving pile fabrics, and in a mode and apparatus for cutting the pile.

2923. Alphonse Médail, of Paris, France. An improved hydraulic machine.

2924. Thomas Williams, of South Castle-street, Liverpool, Lancaster, gun-maker. An improved revolving pistol.

2925. Thomas Seaville Truss, of Cannon-street, London, mechanical engineer. Improvements in breaks for railway carriages and other vehicles.

2926. Thomas Seaville Truss, of Cannon-street, London, mechanical engineer. Improvements in apparatus for communicating between the engine-driver and the guard of railway trains.

2927. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in dyeing. A communication from Monsieur Bellancourt, of Rheims, France, manufacturer.

2928. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the treatment or preparation of wool, and of the wash waters employed in such treatment. A communication from Messrs. Villermet and Mannheimer, of Paris, France, manufacturers.

2929. Stephen Norris, of New Peter-street, Horse-ferry-road, Middlesex. Improvements in lighting and extinguishing gas-lamps.

2930. Samuel Smith, of Horton Dye-works, near Bradford, York. Improvements in preparing rovings and yarns of wool.

2931. Alexander Parkes, of Birmingham. Improvements in separating silver from its ores or other compounds.

2932. Robert Burt Hall, of Whitecross-street, engineer. Improvements in crushing and grinding quartz, minerals, and other matters.

2935. Henry Thomson, of Clitheroe, Lancaster, calico-printer. Improvements in machinery or apparatus for stretching textile fabrics as they are wound into laps or rolls after the processes of bleaching and dyeing, or operations connected therewith.

2936. Robert William Waithman, of Bentham House, York, Esq. Improvements in belts or bands for driving machinery for use in mines, and for other purposes.

Dated December 17, 1853.

2938. Joshua Horton, of Birmingham, Warwick, manufacturer. Improvements in the manufacture of certain kinds of metallic vessels.

2940. Caleb Bedells, of Leicester. Improvements in the manufacture of elastic fabrics.

2942. John Greenwood, of Arthur-street West, London Bridge. Improvements in preventing draughts of air into rooms and places when the doors and windows are shut.

2944. Matthew Parsons Houghton, of Hillmorton, Warwick, clerk, and Andrew Stewart, of Hillmorton aforesaid, mechanic. An improved means of preventing accidents upon railways.

2946. Robert Whewell, of Little Bolton, Bolton-le-Moors, Lancaster, printer and bookbinder. Improvements in machines used for cutting paper.

Dated December 19, 1853.

2948. John Tribelhorn, of St. Gall, manufacturer, and Dr. Pompejus Belley, of Aarau, professor of chemistry, both of Switzerland. Improvements in the process of bleaching vegetable fibrous substances. A communication from Charles Custer, of Altstaetten, near St. Gall, in Switzerland.

2950. William Crossby, miller, Devonshire-street, Sheffield, Yorkshire. The ventilation of granaries, storehouses, or places of deposit for grain whatsoever, and for improvements in the grinding of grain and dressing of grist, and grinding generally.

2952. Richard Waygood, of Newington-causeway, Surrey, ironfounder. Improvements in portable forges.

Dated December 20, 1853.

2954. Adam Paterson, of Westminster, Middlesex. An improved cooking-apparatus.

2956. Josiah Latimer Clark, of Chester-villas, Canonbury-park South, Islington. An improvement in insulating wire used for electric telegraphs, with a view to obviate the effects of return or inductive currents.

2958. Paul Wagenmann, of Bonn, Rhenish Prussia. Improvements in the manufacture of liquid hydro-carbons and paraffine.

2960. Emile Victor Felix Lemaire, of Rue Drouot, Paris. Improvements in tanning.

2962. James Burrows, of Haigh Foundry, near Wigan, Lancaster, engineer. Certain improvements in the formation of such metallic plates as are required to be conjoined by riveting or other similar fastening.

Dated December 21, 1853.

2966. Gottlieb Boccius, of Hammersmith, Middlesex, gentleman. Certain apparatus adapted to the breeding and rearing of fish.

2968. Heiman Kohnstamm, of Union-court, Old Broad-street, London. Certain improvements in the manufacture of imitation leather.

2970. James Dinning and William Inglis, both of Southampton. An improved apparatus for purifying and filtering residuous water.

2972. John Jones, of Glasgow, Lanark, North Britain, engineer. Improvements in governors or regulators for steam engines and other machinery.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," December 30th*, 1853.)

1723. John Lilley. Separating the refuse vegetable matter contained in the stalk and leaves of the plantain species, and also trees grown in tropical climates from the fibrous material of the same, in order that the latter may be manufactured into ropes or cordage, and for other purposes for which hemp and flax are used.

1725. Simon Charles Mayer. An improved domino-bearer

(*From the "London Gazette," January 3rd*, 1854.)

1766. Peter Armand Lecomte de Fontainemoreau. Certain improvements in the manufacture of tiles for roofing. A communication.

1788. John Smeeton. Improvements in the manufacture of tablets and dial-plates, applicable to showing the distances of carriages travelling barometers, compasses, and timepieces.

1802. William Perks, junior. A new or improved tap for drawing off liquids.

1811. Joseph Clistld Daniell. An improvement or improvements in preparing food and litter for cattle, pigs, and other animals.

1821. Charles Hill Snell. Improvements in the manufacture of soap.

1831. William Smith and Thomas Phillips. An improvement in gas stoves.

1865. David Mushet and Edwin Whele. Improvements in propelling steam-vessels, or other vessels.

1951. Samuel Lomas. An improved silk-cleaner.

2072. Jonas Radford. Improvements in clocks or time-keepers.

2302. Alexander Edward Dudley Knox Archer. Improvements in apparatus for applying metallic capsules.

2483. Thomas Seal Blackwell. Improvements in appararus for signalizing and stopping railway trains.

2567. William Foster. Improvements in looms for weaving.

2706. William Joyce and Thomas Meacham. Certain improvements in marine steam engines.

2826. James Robertson. Improvements in the consumption or prevention of smoke.

2841. Lewis Harvey Bates. Improvements in machinery for stamping and cutting metal nuts and other similar metal articles.

2846. William Thomas Henley. Improvements in electric telegraphs.

2860. Arthur James. Improvements in counting, measuring, and weighing needles, and in preparing papers to receive the same.

2863. Charles Mackenzie and Alexander Turnbull. Machinery for paring fruit and vegetables. A communication.

2868. John Chisholm. Improvements in the distillation of organic substances, and in obtaining products therefrom.

2876. Allan Macpherson. Improvements in disinfecting sewers or other drains or depositaries of fœtid matters or gases, and in converting the contents thereof to useful purposes.

2882. Edward Green. Improvements in boilers and furnaces.

2886. Thomas Hollinsworth. Certain improvements in the method of applying breaks to carriages employed upon railways, and in the machinery or apparatus connected therewith.

2896. Frederick Albert Gatty and Emile Kopp. Improvements in printing and dyeing cotton, wool, silk, and other fibrous substances.

2901. John Wibberley. Certain improvements in machinery or apparatus for winding yarns or threads on to spools or bobbins.

2916. Alexander Cochran. Improvements in the application of starch, or other substances of a similar nature, to woven fabrics and in the machinery or apparatus employed therein.

2921. William Tranter. Certain improvements in fire-arms, and in bullets and waddings to be used therewith.

2923. Alphonse Médail. An improved hydraulic machine.

2931. Alexander Parkes. Improvements in separating silver from its ores or other compounds.

2940. Caleb Bedells. Improvements in the manufacture of elastic fabrics.

2942. John Greenwood. Improvements in preventing drafts of air into rooms and places when the doors and windows are shut.

2962. James Burrows. Certain improvements in the formation of such metallic plates as are required to be conjoined by riveting or other similar fastening.

2968. Heiman Kohnstamm. Certain improvements in the manufacture of imitation leather.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed December 29, 1853.

1037. George Thomas Day.

Sealed December 30, 1853.

1574. Elias Robison Handcock.
1575. Auguste Edouard Loradoux Bellford.
1608. Peter Erard.

Sealed January 2, 1854.

1588. John Rollinson and William Rollinson.
1590. Lemuel Wellman Wright.
1592. Richard Archibald Brooman.
1600. Decimus Julius Tripe.
1610. John Hood and William Hood.
1614. James Bradshaw and Thomas Dawson.

Sealed January 4, 1854.

1599. Marcus Davis.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

J. B.—We will answer your questions in our next Number.
G. De Penning.—Your letter will be inserted in our next.
T. Walton.—Undoubtedly friction must be considered in the case you mention, as it will be a considerable force acting in a direction opposite to that of the motive force.

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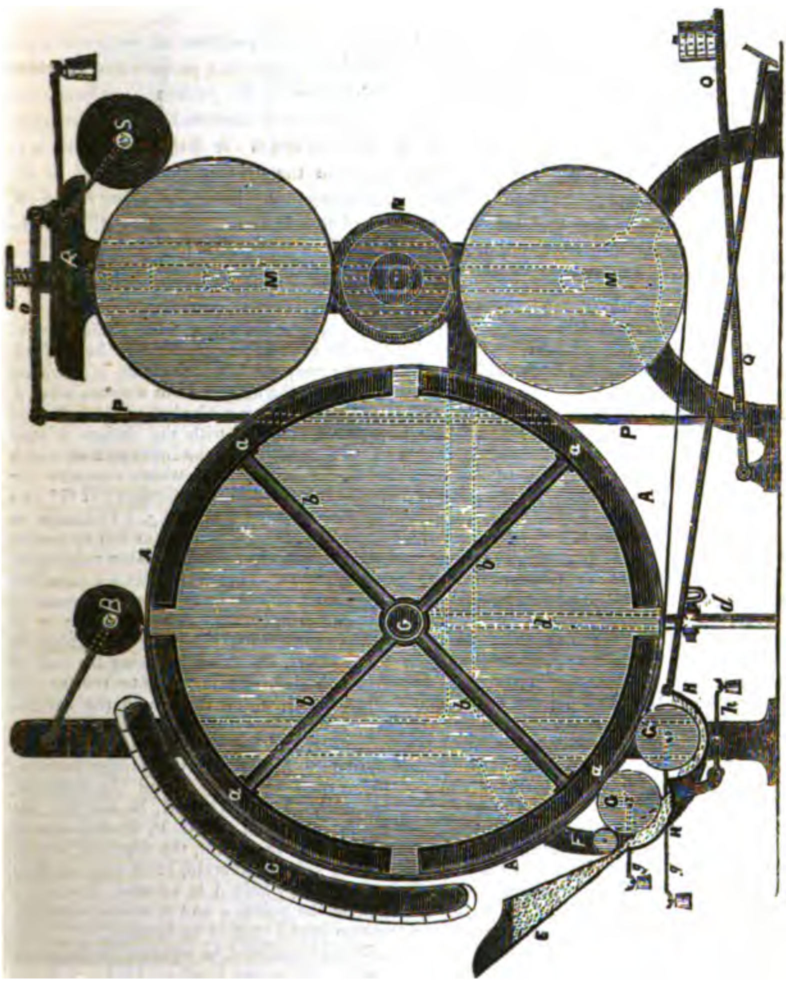
DEPOULLY'S PATENT METHOD OF PRINTING DESIGNS ON FABRICS

Fig. 1.



DEPOULLY'S PATENT METHOD OF PRINTING DESIGNS ON FABRICS.

(Patent dated June 27, 1853.)

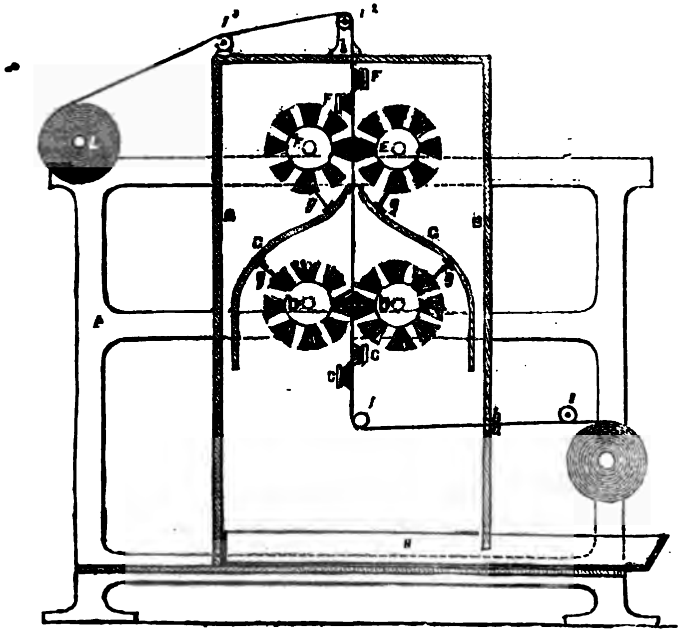
This invention of Mr. Depoully, of Paris, consists in producing designs or patterns on stuffs and fabrics by first printing, stamping, or otherwise impressing on such fabrics some resinous or other substance, simple or compound, which may be rendered adhesive by heat, or by being partially dissolved; which substance is applied in designs and patterns required to be afterwards produced on the fabric. The fabric thus prepared is submitted to heat, or to a solvent, so as to render the resinous matter adhesive, and is then passed through a box containing metal-powder, metal-leaf, flock, powdered colours, or other dry powder, or has these substances otherwise applied thereon; the superfluous powder is next removed from the fabric, and the design in the resinous matter applied will be produced in gold, flock, or other powder employed.

The resinous substance which has been found to answer the purposes of the invention is a compound formed of gutta percha, bitumen, and assam gum, the proportions of which may vary according to the size and thickness of the lines in the pattern to be produced. This compound is reduced to a fit state for printing by being dissolved in naphtha, alcohol, or other solvent, and is then applied on the fabric on which the design or pattern is to be produced by block or machine-printing, precisely in the manner now followed in the printing of designs and patterns on stuffs and other like goods. Instead of being dissolved, the resinous substance may in some cases be reduced to a fit state for printing with by the application of heat; but it is found preferable to use it in solution. The fabric thus prepared, with the design applied thereon in the resinous substance, is then submitted to a process or machine, whereby or wherein the resinous substance is rendered adhesive.

In fig. 1 of the annexed engravings a machine is represented wherein the resinous substance may be rendered adhesive, and in which the metal or other powder may be applied. A is a cylinder, kept heated from the inside by steam cases, *a a*, to which steam is conveyed through the hollow arms, *b b*, supplied by steam through the axis, *c*, from a steam pipe, *d*. The cylinder is free to revolve on its axis, and is surrounded with a blanket or other flannel covering. B is a beam, on which the fabric, previously prepared with the design printed in the resinous composition aforesaid, is wound. C is a steam chest, the inner side of which is concentric with the periphery of the cylinder, A. E is a hopper, which contains the powder to be applied on the printed resinous design. F is a distributing-roller; G G¹ two rollers made to press against the cylinder, A, by the weighted levers, *g g*. The cups or boxes, H H, in which the colour falls from the hopper, E, are made to rise or fall by means of the weighted lever, *h*. M M¹ are cylinders of papier-maché, or other suitable substance, and N an intermediate hollow metal cylinder, heated by steam. These cylinders are mounted in a frame, and are made to press against each other more or less, as required, by means of the levers and rods, O, P, Q, and screw, R. S is a gathering-beam. The operation is as follows:—The fabric, prepared as before described, is caused to travel along the surface of the heated cylinder, A, and between it and the steam-chest, C, before reaching the end of which the resinous substance is softened, becomes adhesive, and is ready to receive the powder which is deposited thereon by the two rollers, G G¹, which revolve in the colour-boxes, H H; the fabric is then caused to pass partly round the cylinder, M, between it and the heated cylinder, N, partly round this heated cylinder, and between it and the cylinder, M¹. Between the heated cylinder and the two cylinders, M and M¹, the powder becomes thoroughly pressed into the resinous design. After passing partly round the cylinder, M¹, the fabric is received on to the gathering-beam, S. The rollers, M, N, and M¹, are caused to exert more or less pressure by means of the lever and rod, O, P, Q, and also by the pressure-screw, R. On being unwound from the gathering-beam, the fabric is beaten, to deprive it of any superfluous powder that may have adhered thereto, or it may be submitted to such a brushing-machine as that shown in fig. 2, where A is a frame, in which a case or box, B, is fitted. The case is closed, except at the points *a* and *b*, where openings are made for the admission into and exit from the case of the stuff to be brushed. C C are two fixed brushes; D D, two brushes, free to revolve and mounted in suitable bearings in the frame, A; and E E two similar brushes, mounted above the brushes, D D. F F are two fixed brushes; G G are guards, and *g g* pegs or combs for cleaning the revolving brushes; H is a drawer at the bottom of the case; I I¹ guide-rollers; K a beam, on which

the fabric to be brushed is wound, and L a similar beam for receiving the fabric after being brushed. The action is as follows:—The fabric is first passed into the brushing-case through the aperture, *a*, under the roller, I, and between the fixed brushes, C C. Rotary motion from some prime-mover is communicated to the brushes, D D and E E, which are caused to revolve in a direction contrary to that in which the fabric advances. After passing between the fixed brushes, C C, the fabric is led between the first pair, then between the second pair, and lastly between the fixed brushes, F F, and out of the case through the aperture, *b*; it is then led over the rollers, I^2 I^3, and is wound on the beam, L. The guards

Fig. 2.



G G, are for the purpose of preventing the powder brushed off from rising into the top of the case, and from being thrown on to the upper brushes. *g g* are fixed pegs or combs for cleaning the revolving brushes. Whatever superfluous powder has not been removed by the brushes, C C and D D, is brushed off by the upper brushes, E E and F F, while the powder removed falls into the drawer, H, from whence it can be removed as required.

If preferred, the resinous design may be rendered adhesive by applying naphtha or other like solvent, or the fumes of naphtha or other solvent. The fabric, with the resinous design, may be passed between two rollers, one of which revolves in a trough containing naphtha or other solvent; or the fabric might be made to pass over a vessel containing naphtha heated to such a degree as to give off vapour. In either case, the resinous substance would be so far dissolved as to become adhesive; and care must be taken to apply the powder or leaf before the resinous substance has become set. After the application of the powder or metal-leaf, the fabric must be beaten or brushed, as hereinbefore explained, in order to rid it of any superfluous powder that may have adhered thereto.

Where metal-leaf is to be applied, it may be conveniently added, by hand or otherwise, after the resinous design has been submitted to a sufficient degree of heat to render the resinous substance or compound adhesive.

The printing with a resinous substance, as before described, may be performed simultaneously with colour-printing, or with printing other designs and patterns in colours, provided always that such colours be of such a nature as not to fly or run on the subsequent application of such heat as may be necessary to cause the resinous substance to become

adhesive. Resinous substances resisting the action of acids, and of such chemical substances as are generally employed in colour-printing, will not be injuriously affected when employed simultaneously with the colours. For the same reason the fabrics, after being printed with a resinous design or pattern, as aforesaid, may be dyed and submitted to the heating process after the dyeing of the fabrics, in order to render the same adhesive to receive the powder, metal-leaf, &c.

In submitting shawls, and other fabrics in short lengths, to this process, it is more convenient to unite them to each other, in order to make a length more suitable to the machines employed in the process. They might, however, be treated separately.

A NEW SYSTEM OF NAVAL WARFARE.

BY JAMES DUNBAR, ESQ., OF DORKERY, THURSO.

(*Continued from page* 8.)

The construction of these submarine shells will be readily understood by the annexed figures, which represent one of brass.

Fig. 1 represents a longitudinal vertical section of a submarine galvanic shell at its centre; fig. 2 is a transverse section of the shell at the line, A E; fig. 3, a plan, or horizontal section of the shell at its centre. *a a*, is the conducting-wire; *b b*, the towing-line; *c c*, an aperture for charging the shell; *d d*, the vertical float; *e e*, stuffing-case round the wire; *f f*, boxes for containing ballast; *g g*, vacant space for securing the towing-line and wire, and charging the shell; in the vertical section this space is shown filled up with cork, as it will be when the shell is charged.

The shell is to be of a cylindrical form, the fore end flat, and the other convex; its exterior diameter to be 3 feet, its length 9

Fig. 1.

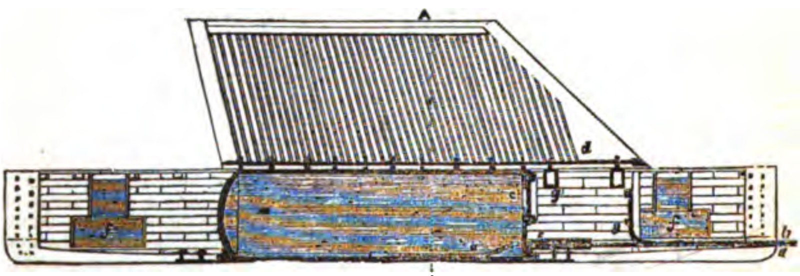
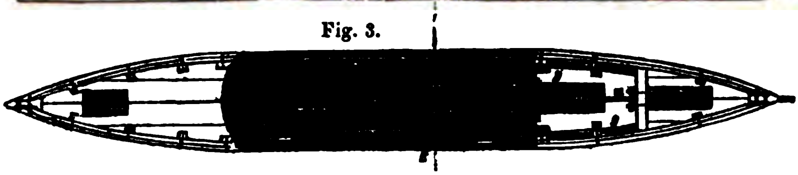


Fig. 3.



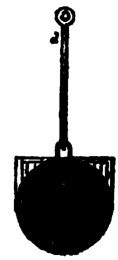
feet, or, including the convex end, 9½ feet; and it is to be three-fourths of an inch thick in all parts. In its fore end is a circular aperture for introducing the interior case and powder; and on its exterior is a number of keepers or projecting pieces of metal, by which the floats are to be attached to it. The float in which the shell is to be suspended is 3 feet in breath, by the same in depth, and 24 feet in length; having the ends sharp and finely curved, so as to be easily drawn through the water. Its two upper side beams are to extend the whole length, their ends being secured by bolts; and to them the shell is to be attached by iron bands at each side; the bottom piece is to be firmly attached to each end of the shell by iron bands, as shown in the section. The float is to be built of two folds of inch planks, strengthened by ribs or cross pieces where necessary; and the whole is to be well caulked and made water-tight before the interior is filled up. To preserve its buoyancy, in case of accidents, such as striking against ships, its whole interior is to be filled up with large pieces of cork, laid close to each other and bound firmly together by a number of small bolts; the space between the shell and the

side framing to be filled up in the same manner. Over the cork a few cross bars of wood are to be laid, having their ends attached to the side framing; and on them the top or deck is to be fixed. In the plans this deck or top is flat, but it would be preferable to have it of a convex form. The principal framing of the float should be of oak, and the rest of fir; and its whole exterior should be thickly painted. At the fore end of the shell a vacant space is to be left in the float, for the purpose of charging the shell and securing the towing rope and conducting wire; which space is to be filled up, when necessary, with a mass of cork, and covered with a hatch securely attached to the side framing by screws. In each end of the float is a box for containing ballast to adjust its depth in the water.

In order to protect the shell from shot, it must be kept at a depth of at least 4 feet below the surface of the water, by means of a vertical float attached to it. The vertical float is to be formed of India-rubber, and to be 4½ feet deep, 2 inches thick, and 9½ feet in length at the top; its fore end having a slope of 45 degrees, in order to pass under any floating object which it encounters, without fixing upon it. As the float must always be in a vertical position, it must be stiffened by a number of small slips of whalebone placed in its centre, which will render it sufficiently rigid and elastic. Its upper part, or that above water, is of a cylindrical form, 6 inches in diameter; and its base is to be firmly attached to the top of the shell by a number of keepers projecting from the latter, through which an iron rod is to pass along its whole length. By means of the vertical float the shell will always be suspended at a depth of 4 feet below the surface of the water, which will be sufficient to protect it from shot; and should a greater depth be necessary, it may be obtained by increasing the height of the float. However, the depth should not exceed what is necessary to preserve the shell, because the nearer it is to the surface, the more powerful will be the effect of the explosion. The only portion of the float visible above water is the cylindrical part, which, from its small size and position, will be struck by few shot. The effect of shot upon caoutchouc is merely to pierce it, without splintering or injuring the adjoining parts; so that although the float were extensively perforated by shot, it would still sustain the shell at its proper depth.

As it is absolutely necessary that the gunpowder should be perfectly preserved from moisture, there is to be an interior case of gutta percha, in which the powder is to be placed; and from that substance being completely impervious to water, its preservation in all circumstances will be insured. The gutta percha case is to be one-tenth of an inch thick, and of the same size as the interior of the shell, to the sides of which it is to be attached with pitch. The opening in its end for introducing the powder is to have a projecting flange around it, and is to be

Fig. 2.



shut by inserting a block of wood lined with gutta percha in the aperture, after which the flange is to be surrounded with a circular iron band firmly compressed by screws, so as to be perfectly water-tight. The large aperture in the end of the shell is to be shut by an iron plate firmly secured to it by screws. Below the large opening a short tube projects from the end of the shell, arouud which a gutta percha tube is placed and firmly compressed; through the brass tube and that surrounding it, a small tube from the interior case is to project, and through the latter is to pass the connecting wire for igniting the shell. Both the tubes and the connecting wire are to have a thin coating of pitch between them, and the whole to be firmly compressed in several places by circular iron bands screwed tightly around them, so that no water may enter; and for further security, the tubes, wire, and compressers, are to be covered with a thick layer of hemp and pitch, which is to be tightly compressed by screws in an iron stuffing-case around them. Great care should be taken that the apertures in the end of the shell are made perfectly water-tight, for on that its success wholly depends.

The shell is to be ignited by means of a galvanic battery situate in the vessel that tows it; the connection with the shell being effected by a small conducting wire, secured from the water by a thick coating of gutta percha. The extremity of the wire is to pass through the fore-end of the float, and through the tubes before mentioned to the middle of the shell, where it terminates; the mass of powder will thus be ignited nearly at its centre, thereby insuring the explosion of the whole simultaneously. The towing-line, by which the shell is to be drawn through the water, should be at least an inch in diameter; and the connecting wire is to be

wound spirally around it, between, and following the course of the folds of the rope. This arrangement will prevent any strain upon the wire, and also its increased length will render it more flexible than it would otherwise be. The wire should be of the smallest diameter that will transmit an electric current of sufficient intensity to ignite gunpowder at a distance of three or four hundred yards. The smaller the wire the more flexible it will be, and consequently, can be wound upon a smaller cylinder. The towing-line is to pass through the fore-end of the float in the same aperture as the wire, and is to be secured to the shell by placing its extremity against the partition in the float, and firmly compressing it there by iron bands screwed upon it, so as not to be withdrawn by any force. The part of the towing-line and wire at the aperture in the end of the float, should be covered with a thin tube of gutta percha, rendered elastic by steel wire, which will prevent its being injured by friction, or by being bent too much at the point of junction with the float. That galvanism will effectually explode the shells, is demonstrated by its universal success in blasting, and more especially by the submarine telegraph between Dover and Calais, by which cannon has frequently been fired. This method of firing the shells will place them completely under the control of those applying them, and enable them to be exploded at the precise moment desired, and also prevent all risk of accidental explosions.

The shell and immersed portion of the float will displace 163 cubic feet of water; and consequently its weight, including gunpowder and ballast, will amount to 4 tons 13 cwts. 16 lbs.; which weight will consist of the following materials:

	Cubic feet.		lbs.
Bronze, or gun-metal	$6\frac{1}{12}$	=	3,346
Malleable iron, in bolts, bands, &c.	1	=	486
Oak and fir, in the float	28	=	1,400
Cork stuffing of the float	59	=	944
Gutta percha, India-rubber, &c.	10	=	560
Gunpowder	58	=	3,335
Total weight of the shell when charged			10,071
Quantity of water displaced by the shell	163	=	10,432
Cast-iron ballast required to regulate its depth		=	361

To burst the shell will require an interior pressure of nearly 10,000 tons, which immense resistance will greatly augment the force of the explosion, and render the charge of powder more effective than a much larger quantity in a weak vessel. In regard to the destructive power of shells of the preceding construction, much cannot be known, no experiments having ever been performed with shells of such size and strength; but it certain that the range of their explosion will be more extensive than any hitherto used, and that they will be sufficiently powerful to destroy instantaneously any ships close to which they are placed. Their effective range, or the distance at which they will blow up ships, can only be determined by experiment. However, assuming the explosive force of gunpowder to be nearly the same in water as in loose sand at an equal depth, it is probable that the distance will be from 12 to 15 yards, a space much more than is necessary to entire success in applying them. Shells built of malleable iron plates would be weaker than brass ones of equal weight; yet by increasing their length, so as to contain higher charges of powder, they will prove equally effective at much less expense. Submarine shells should not be of less diameter or contain less powder than now proposed, because the more extensive their range the more easily can they be applied to ships.

The shells now described are adapted for all kinds of war and trading vessels, and can be more or less advantageously applied by them in proportion to their speed and capability of resisting shot. It is obvious that the shells can be most efficiently applied to vessels by screw steamers of great velocity, and of such strength as to be capable of sustaining the enemy's fire during the short time required in the operation, without disabling their machinery. Many trading steamers possess the necessary speed in a degree much superior to war ones, but from their slight build and exposed arrangement of the machinery, they would inevitably be disabled in any attempt to pass near a weighty war ship, and therefore war steamers alone should be employed for the purpose. To adapt steamers or sailing ships to apply the shells, the following alterations will be necessary. In the stern of each vessel are to be made two apertures, of six inches in diameter, at three or four yards apart, one on each side of the stern-post, and six feet below the suface of the water, which apertures are to be continued

up to the lower gun-deck by means of two massive beams laid in a sloping direction from them to the deck. These beams are to have their extremities strongly secured at the stern and deck, and the apertures are to extend through their centre; thus forming strong sloping tubes, by which the towing-lines and wires of the shells will be brought upon the lower deck without admitting water. Both tubes are to be lined with gutta percha, and in the exterior extremity of each a stout tube of caoutchouc, rendered elastic by steel wires, is to be firmly fixed; the tubes are to extend over the screw-propeller, that the lines may not be cut by it. The flexible tubes should be very thin at their disengaged ends, and of such length that their extremities can be easily raised above water to pass the lines into the vessel, which can be done by gutta percha rods, stiffened with steel wire. These elastic tubes will protect the lines from the screw, and also prevent their being injured by friction On the lower deck, in front of the apertures, there are to be several short wooden cylinders, of three or four feet in diameter, on which the towing-lines and wires are to be wound. These cylinders, of which there must be one for each shell, are only to be fixed upon deck when necessary; and as they may be broken or damaged shot, there should be a few in reserve.

The shells are to be arranged in a train of two or four in number, in rear of the steamer that applies them; and their lines being brought on the lower deck by the above-mentioned tubes, a portion of each is to remain coiled on the cylinders, to enable their distance from the ship to be varied as circumstances may require. The distance between them must be such that the explosion of one will not injure those next it.

Assuming the explosive force of a shell to be nearly the same as that of an equal quantity of powder, exploded at the same depth in earth or sand, they may safely be placed at fifty yards apart; the least distance, however, can only be ascertained by experiment. Four shells disposed at this distance would form a train of 240 yards in length in rear of the vessel, and by unrolling the part of the lines on the cylinders the distance may be increased to 300 yards, beyond which space they cannot be so conveniently applied. During daylight the floats will be distinctly visible, and in the night small white flags should be fixed upon them, that the situation of the shells may be accurately known. A steamer may, according to its size, carry from six to twelve shells, all of which should be charged, ballasted, and ready for use before being taken on board, and should be placed in the bottom of the hold, where they will be as secure from shot as the powder magazine. For depositing them in the hold a narrow hatchway, of twelve feet in length, will be necessary on the orlop or lower gun-deck. As there are no fusees by which they can be accidentally fired, no danger can result from having them on board. The vertical floats are not to be attached to them till outside the ship and ready to be submerged. From the long proportions and small transverse area of the shells, they will require but little force to tow them, and will not much impede the speed of large and powerful steamers. In applying them to ships, the steamer is to proceed at full speed past the vessel at a short distance, so as to bring the rear shell of the train as close as possible to it, upon the explosion of which it will instantly be blown to pieces. Any other in the train could be used, but the rear one, being the most distant, should be first exploded, when practicable. Vessels should not attach or submerge the shells until within a few hours distance of the ships against which they are to act; and the number in a train must depend on the speed at which it will be necessary to proceed. Against swift steamers one or two will be sufficient; but against slow ones, or sailing ships, four may be employed.

It is evident that steamers of great velocity can efficiently apply the shells, in all circumstances, to any war vessels whose fire they may be capable of sustaining during the short time required for the purpose. Swift sailing vessels can also apply them to all ships of inferior speed.

Submarine shells of the preceding construction are adapted for, and can be applied by, all kinds of war and trading vessels at present employed; and advantageous as their adoption would prove in reducing the expense of naval forces, the principle can be further extended, and a still greater saving of expense effected by employing smaller shells, and steamers of a proper construction for applying them.

(*To be continued.*)

ON THE SCREW PROPELLER.

To the Editor of the Mechanics' Magazine.

SIR,—Certainly the tone assumed by Mr. "J. C." towards a letter of mine, on this subject, published in the *Mechanics' Magazine* of the 10th December, 1853, greatly surprises me, especially after the candid acknowledgment of his, that he was far from certain that he understood its purport, which the whole tenor of his letter tends to confirm, and which is proved by his not at all confuting (or attempting even to confute) the *proof* of the theory that pressure—the

result of gravity—is the *principal* resisting force; and thus also unnecessarily taxing me "with holding forth assertions wholly unsupported by proof or argument." Were Mr. "J. C." once more to look at the letter, he would find that, besides my theory being clearly demonstrated and proved, "the fact of the *falling* of the barometer during an *increasing* gale of wind" is brought forward as a convincing proof of a decrease of atmospheric pressure in the case stated; so that my argument evidently was, if such pressure is proved to be the principal cause of resistance in one case, it holds good in every other. Now as Mr. "J. C." does not in the whole of his letter even allude at all to this (the main argument as it clearly is, as on it rests the conclusion that, knowing the principal cause of resistance, we know also the direction of its action, and of the consequent reaction, as it has so long been called, of the resistance of water), but determinately, and wisely also, seems inclined rather to avoid it, it is but left me to consider it beyond his comprehension; and if he will acknowledge this, I will, in a letter devoted only to that subject, give him with geometric figures conclusive proof.

Mr. "J. C.," also evidently for want of consideration, imagines errors in words and expressions, and, without a thought, flings his criticisms on them; and although silence would treat this part of his letter as it best deserves, yet, however, I will bear with his production, lest it be supposed (as in common phrase it is expressed) that he had me even there, and will proceed step by step with it, and explain all that he misunderstands.

Mr. "J. C." first touches on inertia, and tells you that no force at all is necessary to keep a body moving uniformly either in a straight line or about an axis, through its centre of gravity; by this either insinuating that I asserted the contrary, when I clearly implied that power was necessary only to start it from a state of rest or inertness; or, otherwise, throwing away half a column in quoting, he merely explains again what my words clearly enough express.

Next Mr. "J. C." concludes me ignorant of geometry in making use of the expression "of the planes of its blades." Had he taken the trouble to think a moment, he would have found that, from the very small portions of the worms now considered necessary and used,* they are thus with great propriety called blades, and their surfaces could therefore, with as much propriety, also be considered planes, as they ought to be; for it should be remembered that, in explaining the theory, I have nothing whatever to do with make or construction, as the blades must be supposed to exist with equable, or rather with no thickness at all.

Mr. "J. C." then passes to the end of the paper, and states that I assert "that vacuum is the slip." That this arose from an error in statement, is clear; and the words should be—"thus form a vacuum behind, which is supplied by other water. And this is the slip." These words would evidently express what I mean, that the fact of the supply of water to this vacuum is the slip; and this vacuum behind the blade itself, resulting from the moving of the propeller, is merely the immediate cause: and it surely is no fault of mine that, for so long a time, the relative difference of speed should have been misnamed the slip, when the word should have applied to the cause.

In the rest of the same paragraph, Mr. "J. C." whoever he may be, seems determined to display the extent of his knowledge of the composition of forces when he says—"that he cannot help thinking, whatever be the pitch, the" (resultant or) "useful effect of two similar blades will be just double that of one;" whatever also may be the direction of the reacting forces, was all that he forgot to add to have rendered it complete.

It is after all this, that Mr. "J. C.," when he quotes from Miller, first begins to express himself sensibly, and says that he is taught "that pressure on one side is increased, while that on the other is diminished," and that I assert "that pressure is increased on neither side, but diminished on one of them." Here the inference is rightly drawn; but to it I must be allowed to add a qualification, with this explanation—that to prevent the crowding of too much in so small a space, I, in treating on the propeller, explained the nature of the principal resistance of water—the diminishing of the pressure—only, to enable me to obtain the direction of the reaction, omitting to put in a note explaining the *small* amount of the increasing resistance derived from inertness due to gravity, as I had intended; but this in no way affects the explanation of the principle of the propulsive power of the screw, as the reactions of the resistances of both are, as they must be, in the same direction. So that now, it cannot by any means be considered harsh or unjust of me when I say, that it is most singular of Mr. "J. C." that, from his not understanding a point relative to resistance, which was distinctly

* See latest improvements — Maudslay's — of which a cut is given in No. 1573 of *Mech. Mag.*

It were just as ridiculous to expect me to refer to screws now completely out of date as were I to use the expressions ship and vessel to imagine me alluding to those of the times of the Greeks and Romans.

explained by sufficient evidence of demonstration and proof, that he should condemn *in toto*, the explanation of the propulsive power of the screw proved by sufficient data; and this, when possessing but a limited knowledge of the composition of forces, as the expression of his opinion on the resultant of the blades but too clearly testifies.

Mr. "J. C." then propounds two propositions; the first, the same in substance as the above just discussed, which, without being definite, is indifferently explained by him; the second, the exemplification of a cask and a bung, which not in the least detracts from the theory that pressure is the principal cause of resistance, but tends rather to support it by his own admission that the formation of a vacuum is virtually dependant only on velocity; he has yet to learn that but a comparatively very small rate of motion is necessary to produce it. Besides, how comes it, I would here ask of Mr. "J. C.," who expects when I make use of words expressive enough in themselves of their signification, that they shall be accompanied by definitions, &c., that he now leaves so much to my imagination as to determine that this cask (a perfect one, it would be supposed) standing on one end, should have the other, or head, out; or did he rather risk this, than have anything to do with the difficulty, that were the head on, the water would not follow the bung, merely from want of the atmospheric pressure even, and thus have to acknowledge that pressure has a great deal to do with resistance, &c., &c.

Now, before I proceed to explain, and prove by another induction also, my theory of resistance, I will conclude with Mr. "J. C.," with this remark, that should he again express opinions referring either to my former letter or to this, from imagining that he observes in them anything that he deems either not sufficiently explained or unsupported by authority or proof, he will oblige me greatly by expressing himself clearly to the point, and keep that only before him till he is done with it; and I will with pleasure explain the difficulty which, from his not understanding, he labours under, and would advise him not so wildly again to rush and jump to a conclusion when terrified at seeing words expressed with new import *to him*, and state that "he is justified in refusing to receive my opinion on any point," &c. It were far better of him, as it were more rational, to have asked or demanded an explanation of anything that he thought ill expressed, or pointedly to have given his dissent and reason to whatever he considered was wrongly adduced.

Beginning, then, with that part of my letter that first treats on resistance, and in which Mr. "J. C." seems to see much that he considers erroneous, I will now further explain it. "This force, reaction, is nothing more than atmospheric pressure, plus that of the *column*, or depth of water the propeller may be in, on the surface of its blades acting towards the vacuum on the other side, formed by their changing place in turning." The meaning of this enunciation is clear enough, that the reaction of resistance is the action of pressure occasioned by the pressure on the negative side being diminished or removed, and to its support I brought the following arguments: *In vacuo* the blades, in turning round, meet with no resistance,—in *air* they would; but by the demonstration there given, and with the fact adduced, the fall of the barometer, &c., we find that resistance is caused by the diminishing of pressure, and is the result therefore of the pressure on the positive side. It was, then, evidently reasonable to conclude that pressure also is the principal resistance of water. Now, the matter resolves itself into this,—it *is* the case, or it *is not*. If it is not, then the resistance met with in water is due to some other cause than that of pressure. Pressure (or weight) is the *principal* result or effect of the attraction of gravity. Of this there cannot be a doubt; but as it is argued that in water the resistance is other than that of pressure, let gravity be imagined to be removed, or not to exist. *Now*, would a propeller moving in water meet with any resistance? Most assuredly not! If gravity, then, is the cause, and the only cause of resistance, then also is the principal result of gravity, viz., pressure, (that of the water and that of the atmosphere), the chief amount of the resistance to the blades of a screw propeller when turned in water.

Now, besides this, I will acknowledge that gravity brings also a new source of resistance into play, and it is a resistance of inertness, a power the water derives from its adhesiveness, or the attraction of its particles towards one another to form a mass, and the attraction of gravity on that mass, tending to render it inert. But it is sufficient now for me to state, that the amount of resistance that water, by virtue of this property, would offer to a body moving in it, *is small*, and would be proportionate to the quantity or mass of water put in motion and carried along with the moving body, and will be found to increase in a proportion less even than in a simple ratio with the velocity; consequently this resistance is limited up to a certain rate or point. Leaving this to be proved hereafter, I will, with your permission, Sir, make it the subject of another letter.

And now, lest that I should unnecessarily be again called to question for omitting to bring forward facts to support my hypothesis, as it is called, I will here adduce one that the concurring experience and knowledge of many have confirmed; and it is from the Report of the British Association for the Advancement of Science, and expressed in these words: "The resistance of a fluid to the motion of a floating body will rapidly increase as the velocity of the body rises towards the velocity of the wave of displacement caused by the said motion, and it will be greatest when the two velocities approach equality.

"When the velocity of the body is rendered greater than that due to the wave, the motion of the body is greatly facilitated. It remains poised on the summit of the wave in a position which may be one of stable equilibrium, and this effect is such that at a velocity of 9 miles per hour, the resistance is less than at a velocity of 6 miles per hour behind the wave."

As it would be out of place here, as I have, perhaps, trespassed too far, Sir, on your space already, I will avoid explanation of what is meant by this wave of displacement, and keep only to the fact that no increase of resistance, after a certain velocity, is found to exist; which bears me out wholly as the resistances of pressure or of inertness are both limited.

I am, Sir, yours, &c.,
G. De Penning.

Charing-cross, Jan. 4, 1854.

TURNING MACHINERY.

To the Editor of the Mechanics' Magazine.

Sir,—Some years ago there appeared in your columns a description, by an amateur, of a revolving slide rest, applicable to turning external and internal spherical surfaces in the lathe. At that time your correspondent, Mr. William Baddeley, in commenting on the above, promised, at some future time, to communicate to your readers his method of forming such a tool, in a much more complete and satisfactory manner than that described. Up to the present time, however, I have not been able to trace any further communication from Mr. Baddeley on the subject; and, believing that the promised description would prove interesting and useful to a large proportion of your readers, I take the liberty of reminding him, through you, of his promise.

I take advantage of the opportunity afforded by my writing to you, of calling attention to the very great delay which has taken place in the issue of the promised volumes of the late Mr. Holtzapffel's work on Turning and Mechanical Manipulation. Nothing can exceed the excellence and completeness of the information contained in the three volumes already published; and I feel sure that there are very many amateur turners who, like myself, have been looking forward anxiously for the publication of the fourth volume; and yet, although three years ago the publishers stated that so many pages of the fourth volume were already in print, up to the present time no intimation has been made of its being forthcoming. As I cannot doubt that this publication must be profitable, I trust the appearance of this letter in your Magazine, with the addition of any remarks you may think proper to make on the subject, may have the effect of accelerating the desired publication.*

I am, Sir, yours, &c.,
January 4, 1854. Artifex.

A PROBLEM IN NAVAL ARCHITECTURE.

To the Editor of the Mechanics' Magazine.

Sir,—There are several methods of solving the following problem, in the practice of naval architecture; but I do not find that any of them combine with demonstrable correctness the same readiness of application as that which struck me some time since, and which, with your permission, I publish for the benefit of your readers.

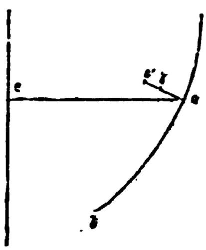
The first or construction drawing of a ship gives the form of the sections, with the plank on them, for the purposes of calculation; the second, necessary for *laying off* the ship, gives those sections without the plank. The problem is, to obtain the second from the first, when the thickness of plank is given, as it will be evident enough that the obliquity of the surface of the bottom to the planes of the sections will give to the sections of the plank upon them a thickness greatly superior in some parts to the real thickness of the plank.

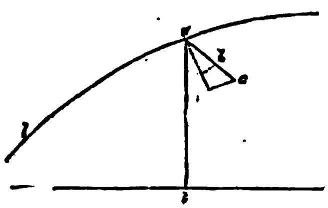
Let $(at, a't')$ be the projections of one of the transverse sections in the half-breadth and body-plans respectively; $(al, a'l')$ one of the level lines, intersecting the former line in the point (a, a'). If we wish to construct the building-draft from the construction-draft, it is required to know how much must be set in from a and a' to get points in the new curves. If the converse problem is proposed, these distances must be set out; the solution is the same in both cases, modified by this single fact.

Draw (ab) and $(a'b')$ respectively perpen-

* We have applied to the publishers, but can obtain no information as to the cause of the delay in issuing the fourth volume.—Ed.

dicular to the level and transverse section at (a) and (a′), and of any lengths, so that (b) and (b′) are at the same distances from their respective middle lines: set off from (b) at right angles to (a b) the perpendicular distance of (b′) from (a′ b′); hold the scale so that it passes through this new point, and (a), and set off with it from (a) the given thickness of plank: a perpendicular





to the edge of the scale through the point so found will meet (a b) produced in a point (c) contained by the new level line: the corresponding point, c′, in the body is that point in (a′ b′) produced which lies at the same distance as (c) from its middle line.

If any of your readers desire the geometrical proof of this, I shall be happy to give it; and beg to refer them for the principle of the solution of this and analogous problems to treatises on descriptive geometry.

I am, Sir, yours, &c.,

N. BARNABY.

Sheerness, Jan. 9, 1854.

WOOD FASTENINGS.

To the Editor of the Mechanics' Magazine.

SIR,—In page 447 of your Magazine for this month, there is a description of improved wood fastenings. I beg to state that, about nine or ten years ago, I used a similar process for inserting the rivets in my concussion fuze, to cause shells to explode on striking the object. I tried lead, pewter, and different compositions, and alloys. Lead and pewter charred the wood too much; but the alloy called fusible metal, I found answer best. The composition of which gardeners' wire is formed also answers very well. The diagram No. 7, page 2, in my pamphlet on Projectiles, represents the fuze I allude to. My experiments in the marshes at Woolwich, nine years ago, with this fuze were so successful, that the Select Committee at Woolwich officially reported to the Master-General that they were "simple, safe, and efficacious, being well adapted for horizontal fire at high velocities."

I am, Sir, yours, &c.,

J. NORTON.

Victoria Hotel, Cork, Jan. 7, 1854.

ON PROPERTY IN DESIGNS, ETC.

BY T. WEBSTER, BARRISTER-AT-LAW.

(*Continued from page* 13.)

OUR readers will not have failed to observe the distinctness with which Mr. Webster, in the extracts we quoted last week, declares his conviction that property in designs and inventions in the arts and manufactures has its origin in the constitution of man, and is a natural development of general laws. To those persons who have hitherto viewed the subject only in its philosophical phases, the statement of such a conviction may certainly appear somewhat trite; but those who are acquainted with much that has lately, in various ways, been published respecting it, will see the necessity that exists for juridical writers pronouncing clearly upon this point. That this is also Mr. Webster's opinion, will be seen from the following passage of his work:

"Whatever may be the true theory of the origin and rights of property, it is certain that creations of the mind or intellectual labour, when embodied in a practical form so as to be available to mankind, whether in books, music, paintings, designs, or inventions in the arts and manufactures, have been recognised almost universally by writers on jurisprudence, on ethical philosophy, and on political economy, and by civilised communities, as a subject of property and protection equally with the material forms in which such creations are embodied. To deny to the cultivated mind or educated man property in the productions of his peculiar labour, or of the exercise of those powers by which he is distinguished from his fellows, and which it has been the object of his education to improve to the utmost, is a proposition which in terms has yet found no advocate, although the alleged opinions recently advanced on

the subject of patent rights for inventions would appear to lead inevitably thereto. To deny to the creations and labour of the mind that property and protection by the civil power which is given to the skill of the hand or to bodily labour, is in effect to make intellectual of no account, as compared with manual labour, and to give a predominating and overwhelming influence to capital and those other representations of accumulated labour which may be profitably enjoyed without any fresh creations of mind or exercise of inventive faculties."

Nor does the author ever lose sight of this principle. On pages 10 and 11 he says:

"Property in new inventions in the arts and manufactures, and adequate protection to such property for a limited time, form part of the legislation of almost every civilised nation or settled government. The specific legislation in different countries, the length of term during which the protection is extended, and the mode of its enjoyment, are various, but such legislation recognises the principle of property in useful inventions, and the policy of protecting it. 'The American Constitution (to use the words of one of its greatest ornaments) does not attempt to give an inventor a right to his invention, or an author a right to his composition; it recognises an original pre-existing inherent right of property in the invention, and authorises Congress to secure to inventors the enjoyment of that right; but the right exists before the Constitution and above the Constitution, and is, as a natural right, more than that which a man can assert in almost any other kind of property.' The practical application of this principle in the United States, under the provisions of the Acts of Congress, are less favourable to inventors than in this country; but the recognition, from the first dawn of the Constitution, of what was due to intellectual labour contrasts most favourably with the struggles which authors and inventors have experienced in this country in protecting their rights. The struggle against prejudice and illiberality in the Legislature was long and severe; but since the elaborate argument of Lord Camden against the common-law right of property in a literary composition, the existence of such property at common law and its policy have not been seriously questioned.

"The policy of patent rights has been recognised by the most eminent jurists and political economists, and though some difference of opinion may exist as to the duration of such rights, or as to the question whether other than the existing systems might not be adopted with advantage, no person (until the recent discussions on Patent Law Reform hereafter referred to) has publicly advanced any arguments against the principle, policy, or justice of rewards to this species of intellectual labour."

Again, it is apparent that designs and inventions are proper subjects of possession, from the consideration that the designer or inventor *first brings them into existence*, and thereby obtains a claim upon them in which others cannot possibly expect to share;—a claim peculiar to him, as their author. This speciality of possessory right on the part of designers and inventors is thus ably put by Mr. Webster:

"Further, the possession of such property has this peculiar claim derived from the nature of the subject; namely, that the subject-matter of such property did not exist like land, the air, or wild animals, as part of the common stock provided for all mankind; such property is, in the strictest sense of the term, a creation, and not a discovery or finding of something created by the great Author of all things, and already existing. The thoughts of man are peculiarly and essentially his own, and unless embodied in some practical form, and communicated by publication to the world, would die with their author. To prevent this, and ensure their preservation and publication, may be regarded as part of the policy of the law which will be further dwelt upon hereafter."

After establishing, on philosophical grounds, the intrinsic justice of the practice of granting patents, the author proceeds to demonstrate the equity and policy of the system, and to discuss the more plausible objections which have lately been brought against it. He remarks:

"The principal objection relied upon by the opponents of the patent system has always arisen from a confounding them with the old system of monopolies, so odious to the law. The statement that the tendency of the system was to raise the price of the commodity during the fourteen years which the patent exists, is not rigidly correct; the tendency of the system is to keep, maintain, or continue the price, during the subsistence of the patent, higher than after the expiration; but inasmuch as no such article existed before the patent, it is not strictly accurate to say that the price is raised, the patent article being of necessity a different, and either a better or a cheaper, article than

existed before, otherwise no person will buy it.

"It was an incident of the old monopolies, with which patent rights were, and still are to some extent, confounded, that the holders of such privileges were enabled to raise the price of commodities, and to put invincible restraints on commerce, industry, and emulation in the arts. But such a state of things is wholly inapplicable to patent rights, which only exist on the assumption that the commodity, the subject thereof, is a new, a better, or a cheaper article than existed before. A patent right, unlike the old monopoly, involves no principle of exclusive sale, except as incident to, or in connexion with, the working or making of the particular manufacture; it has none of the incidents, and can produce none of the evils of the old monopoly, so justly odious and illegal, and opposed to every true principle of political economy.

"A patent right deprives the public of nothing which they had or enjoyed before; no one can be restrained thereby in anything he was doing before; and if the new manufacture, the subject of the patent, be not cheaper or better, the public will continue to purchase the old article; and if the new manufacture be a new article or commodity introduced then for the first time, and not simply an improvement on an existing article, the public will not purchase or adopt it unless the price be reasonable. The inventor must have given to the public something which they did not possess, or his hopes of reward or remuneration will be hopeless.

"So firmly has the idea that the patentee must give to the public something not before possessed by them, become rooted in the mind as an inherent principle of such rights, that many jurists have represented the grant of such rights as a contract between the patentee and the public, the consideration of such contract being the communication to the public of knowledge, not before possessed by them. If others possessed the knowledge, or the means of attaining the knowledge, for practising the invention professed to be communicated for the first time by the patentee, the grant is invalid, whether the public have ever availed themselves of such knowledge or not. The public, it has been said, forbear to use the invention for a limited time in consideration of the knowledge communicated to them, and its becoming free to them at the expiration of the term."

We have only space to allude to one other phase of the subject presented by Mr. Webster: it is the injustice and impolicy of leaving inventive genius to make its way, unassisted, against the powers and prejudices of capitalists, trusting to their beneficence alone for its remunerations. We regret that our brief extracts must necessarily convey but a very imperfect representation of the skill and temper which the author here manifests; the following, however, will be read with pleasure:

"Others think that the operative would be better rewarded by trusting to the liberality of his master than by any patent system. This latter opinion is supported by the testimony of one witness of practical experience, while others of equal, if not greater, experience place no confidence in such liberality. Mr. Brunel, who is of opinion 'that the greater number of inventions have really originated with operatives,' thinks also, that a good master would have the invention of the operative freely shown him, and that he would reward the inventor by a pound or two, according to what was really earned, and that this would be better than the dreams of hundreds of pounds which are never realised. If the relationship of operative and employer were universally what could be desired, the position of the ingenious man, under a good and liberal master, would probably be better than under the present patent system, or even any system that can be devised. But assuming such a happy combination, the master and man would, in many cases, be induced to keep the secret, and thus all the mischiefs of secret manufacture so much mitigated, if not altogether prevented by the patent system, would be revived. It may be extremely difficult, under any patent system, to ensure proper and adequate reward to the inventor in all cases; and if the interests of the inventor were the real and only consideration, this difficulty would be a serious objection to the system. But the case of the public is wholly different; progress in the practical arts by the introduction of new inventions is of national importance, and whatever may be the effect on inventors, the patent system must tend to stimulate invention, and to obtain a disclosure of secrets which might otherwise be lost."

* * * *

"It must also be borne in mind, that as regards many useful inventions, the inventor is so much in advance of his employer, if not of the age, and the temptation to the capitalist to smother the improvement, or to the manufacturer to work it in secret, may be so great, that such a system could never attain the public objects, however beneficial it might be to the private interests of the inventor."

We cordially recommend the work as a clear, concise, and interesting exposition of the rights of inventors and designers to possess the fruits of their own genius and industry.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Minasi, Carlo, of Camden-town, Middlesex, professor of music. *Improvements in concertinas.* Patent dated June 28, 1853. (No. 1559.)

This invention consists—1. In constructing concertinas with partitions on both sides of the plate of the pan, or note-frame, which holds the notes, so as to form chambers on both sides instead of on one side only, and thus to constitute a double pan. And, 2. In constructing concertinas with two or more pans or note frames, either at one or at both ends of the instrument, and in suitable arrangements, whereby a key played may cause a note to sound either in the inner or in the outer pan, or in both the pans simultaneously.

Bellford, Auguste Edouard Loradoux, of Castle-street, Holborn, London. *Improvements in steam boilers.* (A communication.) Patent dated June 28, 1853. (No. 1561.)

Claims.—1. A boiler, composed of an external water-jacket, with a steam-chamber at the top, and with or without one or more inner water-jackets, connected, and in communication with the outer one, when either water-jacket is surrounded internally with one or more vertical coils of pipe, whose lower ends are connected with one of the water-jackets, and whose upper ends discharge into the steam-chamber. 2. Drying the steam by passing it through a coil of pipe, within or between the water-jackets.

Bellford, Auguste Edouard Loradoux, of Castle-street, Holborn, London. *Improvements in magneto-electric machines.* (A communication.) Patent dated June 28, 1853. (No. 1562.)

This invention consists in an arrangement of permanent magnets and helices and other conductors, and in the peculiar construction of what is termed the "current discharger," (which is analogous to what is termed the "pole changer" in other magneto-electric machines,) whereby several currents are developed at the same time, whose changes of direction take place at successive intervals, so that only one is broken at a time, and whereby the changing of the poles in the "current discharger" is effected at the precise moment of the change, in the direction of the currents induced in the helices.

Johnson, John Henry, of Lincoln's-inn-fields, Middlesex. *Improvements in turning over the leaves of books, music, and engravings, and in the apparatus for effecting the same.* (A communication.) Patent dated June 28, 1853. (No. 1563.)

Claims.—1. The application and use of a magnet in conjunction with iron or steel discs or clips attached to the leaves to be turned. 2. A peculiar arrangement of cords, pulleys, springs, and levers, for effecting the turning of leaves of books.

Irons, Thomas Edward, of Marketgate, in Arbroath, North Britain, last maker. *Improvements in the manufacture of lasts, and in the machinery connected therewith, parts of which machinery are also applicable to other like purposes of eccentric turning.* Patent dated June 29, 1853. (No. 1564.)

This invention consists—1. In a certain arrangement of machinery for cutting or turning lasts, by means of which the turner can at the same time cut right and left foot lasts from the same pattern. 2. In substituting a circular cut in the front of block lasts, for the usual straight or square cut, by which means the block of the improved last makes its own fastening without requiring a pair to hold it when in use. 3. In a peculiar arrangement for polishing the lasts, by means of endless bands, covered in a suitable manner with glass, or emery; and,—4. In applying the improved arrangement of machinery to the purposes of eccentric turning generally.

Fontainemoreau, Peter Armand Lecomte de, of South-street, Finsbury, London. *Improvements in the construction of furnaces.* (A communication.) Patent dated June 29, 1853. (No. 1566.)

This invention consists in constructing the grates of furnaces, for heating boilers and other similar purposes, of two separate parts, and setting them at either side of the fire-place, in an inclined position, so as to admit the air laterally on the fuel and increase the draft. The grate may be made either of the ordinary furnace-bars or of fire-bricks suitably disposed.

Sievier, Robert Moore, of Louviers, France, but now at Manchester, Lancaster, manufacturer. *Improvements in the manufacture of piled fabrics, and in machinery for effecting the same.* Patent dated June 29, 1853. (No. 1568.)

Claim.—Making a printed warp of double the length necessary for its pattern, by a printing or colouring roller of double the width necessary for a single cloth, to weave what is called a double cloth, so that when this warp has been woven into a fabric and divided or separated, two perfectly patterned fabrics are produced.

Imray, John, of Bridge-road, Lambeth, Surrey, engineer. *Improvements in*

obtaining motive power. Patent dated June 29, 1853. (No. 1569.)

Claim.—Apparatus consisting of a vessel divided into suitable compartments, into which are introduced fuel, air for its combustion, and water, so arranged that the heated gases arising from the combustion of the fuel shall not only pass over surfaces of the parts containing water, for the purpose of heating it, as in ordinary boilers, but shall also be forced through the water in numerous subdivided streams, so as to generate vapour by actual contact with the water; and being thus cooled down to a convenient temperature and depositing solid impurities, shall become available, along with the steam, as an elastic fluid exerting pressure, partly for working apparatus to sustain the supply of the air, water, and fuel, and partly for obtaining motive power.

BIDDELL, GEORGE ARTHUR, of Ipswich, engineer. *Improvements in apparatus for cutting vegetable and other substances.* Patent dated June 29, 1853. (No. 1570.)

This invention consists in forming the cutters of apparatus for cutting vegetable and other substances from angular or V-shaped bars of iron or steel, which may be rolled and cut into suitable lengths, and arranged upon an axis in such manner, that one edge of each bar or cutter will act as a cutting surface, and each of these bars or cutters may be also so arranged, that when any one of the edges becomes blunt or injured, the cutter can be readily taken out, and the edges reversed, or, if necessary, another cutter substituted.

TATLOW, JAMES, of the firm of J. and W. Tatlow, of Wirksworth, Derby, smallware manufacturer, and HENRY HODGKINSON, of the same place, mechanic. *Improvements in smallware looms.* Patent dated June 29, 1853. (No. 1572.)

A full description of this invention formed the first article of our last Number.

HANDCOCK, ELIAS ROBISON, of Pall-mall, Westminster. *Certain improvements in mechanism to decrease friction in propelling machinery, and to compensate for the wear thereof, and to strengthen the driving parts.* Patent dated June 30, 1853. (No. 1574.)

Claims.—1. A peculiar formation of teeth, and an arrangement by which only one tooth of each wheel can come in contact during a portion of the stroke, and never more than four teeth, being two of each wheel during the other part of the stroke, thereby considerably reducing friction, and preventing back-lash, and securing a rolling instead of a rubbing motion along the whole face of the tooth. 2. A peculiar manner of compensating for wear, by inserting or affixing pieces of hard metal or other substances on the face of the tooth, and of muffling the teeth and preventing vibration or noise by facing the teeth of one or both wheels with wood, having for support such a body of metal as will prevent all likelihood of the teeth breaking or being stripped in working. 3. A peculiar manner of obtaining a reverse action, where such is desirable, as in the case of the screw for steam vessels, by attaching two sets of wheels together, the teeth of one set being in a reverse position to those of the other, and so arranging them that one set of wheels, when acting, will be thrown out of gear and become quite detached while the other set is in action.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, Holborn. *Improvements in the construction of submarine or subaqueous tunnels or ways.* (A communication.) Patent dated June 30, 1853. (No. 1575.)

Claim.—A method of forming submarine or subaqueous tunnels and passages in sections of cast-iron, lowered one by one into a suitable bed excavated in the bottom of the river, harbour, or other water, and so constructed, that those which are lowered form a railway for the travelling derrick to lower the others by, and that those being lowered will always drop into proper positions in relation to those which are already in place, so that the whole structure can be properly weighted down.

RICE, WILLIAM, of Boston, Lincoln, miller and corn merchant. *Improvements in harness for horses and other animals, and in the manufacture of springs for the same.* Patent dated June 30, 1853. (No. 1576.)

This invention consists—1. In the application of springs to certain parts of harness by means, in each case, of suitable hooks, eyes, buckles, or other convenient fastenings; and 2. In improvements in the manufacture of springs for harness by constructing them of a compound or sliding metal framing, cased or otherwise, and of one or more pieces of vulcanized India-rubber, or of steel, in a helical or other form, and of suitable fastenings for securing the same.

DAVIES, EDWARD, of Gothenburg, Sweden, manufacturer. *Improvements in machinery or apparatus for carding and otherwise preparing cotton or other fibrous materials to be spun, and also for cleaning or stripping cards used in the said operations.* Patent dated June 30, 1853. (No. 1580.)

Claims.—1. An arrangement and construction of a carding engine with additional smaller cylinder-rollers and clearers, with self-acting stripping roller. 2. A lap machine, with a regulator to prevent the stretching of the sliver.

SPOONER, WILLIAM CHARLES, of Eling-

house, near Southampton, Hants, manufacturer of chemical manures. *Improvements in drills for agricultural purposes.* Patent dated June 30, 1853. (No. 1581.)

This invention relates to the depositing of liquid in the soil at the period of sowing through pipes or cans, and to the employment of a seed-box and manure-drill, so that seed, manure, and water may enter the soil in close proximity to each other.

TASKER, WILLIAM, of the firm of Tasker and Fowle, of the Waterloo-works, near Andover, Hants. *Improvements in drills for agricultural purposes.* Patent dated June 30, 1853. (No. 1582.)

This invention relates to an arrangement of mechanism for giving a regular and constant supply from the manure-box of manure distributors, and consists in placing a cylinder or portion of a cylinder in the bottom of a box containing manure; round this fixed cylinder a fluted cylinder revolves, the flutes or projections of which, being in close contact with the exterior of the fixed cylinder, form a number of cavities, into which the manure falls, and by the revolution of the cylinder, it is then conveyed through conducting-pipes into the ground. The revolving cylinder may be fixed either on a square or round spindle, traversing the whole length of the box; and any number of such cylinders may be fixed upon it. A rotatory motion is given by different sized cog-wheels fixed at the end of a spindle in connection with that fitted on the travelling-wheel of the machine, which acts as a driving-wheel.

BRADLEY, RICHARD, and WILLIAM CRAVEN, of Westgate-common Foundry, Wakefield, York, engineers and ironfounders. *Improvements in the moulding, forming, and compressing of clay for the manufacture of bricks, tiles, and other earthenware.* Patent dated July 1, 1853. (No. 1583.)

This invention consists of a pug-mill working with a vertical shaft, and set in motion by a power communicated through machinery of the ordinary kind, this being placed over a horizontal circular table connected with the same shaft, and rotating with it. In this table are certain cavities or cells, into which moulds are inserted of any required form or size, into which the tempered clay is supplied by the pug-mill. Upon the shaft of the mill are knives or blades set at an angle, and these revolving with the shaft, force down the clay in the cylinder of the pug-mill, tempering it in its passage. At the base of the mill, and at the lower end of the shaft, four other knives or blades are also set at a convenient angle, which work immediately over the face of the table, and as they revolve with the shaft force the clay into the moulds contained in the cavities of the table and fill them in their successive passages under the mill.

GETTY, JOHN, of Liverpool, Lancaster, merchant. *Certain improvements in shipbuilding.* Patent dated July 1, 1853. (No. 1585.)

These improvements have reference to the construction of the lower parts of iron vessels, and consist in so arranging and shaping the frames or ribs, and the garboard strakes of the vessel, as to ensure an uninterrupted passage to the pumps from stem to stern of the vessel, for any water that may collect in its hold.

SHEPARD, EDWARD CLARENCE, of Trafalgar-square, Middlesex, gentleman. *Improvements in magneto-electric apparatus suitable for the production of motive power, of heat, and of light.* (A communication.) Patent dated July 1, 1853. (No. 1587.)

This invention has for its object improvements in the apparatus described in the specification of a former patent granted to the patentee, July 6, 1852; and these improvements consist of peculiar means and combination of apparatus for coupling up the metallic circuits, by which induced currents of electricity are conducted to, and caused to decompose water, and thus to obtain gases for the purposes of producing motive power, light, and heat.

ROLLINSON, JOHN, of Kingswinford, Stafford, engineer, and WILLIAM ROLLINSON, of Brierly-hill, Stafford, engineer. *A new or improved apparatus for preventing explosions in steam boilers.* Patent dated July 1, 1853. (No. 1588.)

Claim.—An apparatus to be attached to a steam boiler which, by means of a float and weighted piston, opens a safety valve, either when the water in the boiler is too low, or the pressure of steam too high, the said apparatus also closing the communication with any other boiler or boilers when the water is too low.

WRIGHT, LEMUEL WELLMAN, of Chalford, Gloucester, engineer. *Improvements in machinery or apparatus for reducing and pulverising gold and other metalliferous quartz and earths, and in separating metal therefrom.* Patent dated July 2, 1853. (No. 1590.)

Claims.—1. The employment of a main or central cylinder combined with several small cylinders, partly surrounding the same and revolving by contact with the main cylinder and the materials under process of crushing. 2. The employment of horizontal rollers or cylinders working against a revolving table or disc, and caused to revolve by contact therewith; and the employment also of scrapers or gatherers, for keeping the material to be reduced under the action of the horizontal rollers.—3. Certain described mixing and washing machines.

SHEPARD, EDWARD CLARENCE, of Tra-

falgar-square, Middlesex, gentleman. *Improvements in the manufacture of gas.* (A communication.) Patent dated July 2, 1853. (No. 1591.)

The water to be employed according to this invention, the patentee combines with concentrated sulphuric acid, which he saturates with liquid ammonia, and he mixes one part by measure of this compound with five parts of water (he does not, however, confine himself to these proportions); and he causes the water thus combined or mixed with the other matters to be decomposed by electric currents, and employs the gases thus obtained in the manner described in the specification of his former patent, dated January 4, 1853.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166 Fleet-street, London, patent agents. *Certain machinery for converting caoutchouc into circular blocks or cylinders, and for manufacturing the same into sheets.* (A communication from François Peroncel, of Paris.) Patent dated July 2, 1853. (No. 1592.)

The first part of this invention consists of machinery intended to produce a compact cylinder or roller of caoutchouc free from bubbles; and the second part, of machinery to be employed in slicing or cutting up these cylinders or rollers into sheets of great length and of any required thickness with a perfectly smooth surface.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent agents. *Impregnating, saturating, or covering yarns, threads, and fabrics with metals.* (A communication.) Patent dated July 2, 1853. (No. 1593.)

This invention consists of a mode or modes of impregnating, saturating, or covering yarns, threads, and fabrics made of fibrous materials, with metals, so as to give them a metallic appearance, and which M. Depoully, of Paris, the inventor, calls "Metallic Dyeing."

AMEZAGA, FRANÇOIS MATHIEU DE, of Bordeaux, France, captain in the Sardinian navy. *A method of obtaining motive power, and certain machinery or apparatus employed therein.* Patent dated July 4, 1853. (No. 1596.)

This invention consists in a method of obtaining motive power by receiving the action of a falling body upon an arrangement of drums and levers, so arranged that they may be caused to rotate and otherwise move by changing the positions of certain weights.

DAVIS, MARCUS, of Gray's-Inn-lane, Middlesex, silent carriage-maker. *Improvements in carriages, scaffoldings, and ladders, which scaffoldings and ladders are used as carriages.* Patent dated July 5, 1853. (No. 1599.)

The inventor claims a method of imparting strength to the tubes for axles for common or railroads, and tubes employed in the construction of carriages and scaffoldings, and a spherical axle, and double spherical axle, and combinations thereof, for employment in all kinds of wheels and under carriage work, and other arrangements.

TRIPE, DECIMUS JULIUS, of the Commercial-road East, Middlesex, student in medicine. *Improvements in locks.* Patent dated July 5, 1853. (No. 1600.)

The means employed by the inventor for preventing pressure on the tumblers of the lock, consist in the use of certain levers working on fulcrums that are allowed to catch at one of their extremities in the upper side (or underside, in some modifications of the invention), of the bolt.

FALL, JOHN, of Chorlton-upon-Medlock, Manchester, gentleman. *Improvements in the treatment of certain oils.* Patent dated July 5, 1853. (No. 1601.)

This invention consists in dissolving common yellow resin, colophony, Burgundy pitch, terebrenthine, or turpentine, as they exude from the tree, and the products of the distillation of such resins in oils procured by distilling coals, peat, petroleum, bitumens, asphalts, shales, schists, blues, and other mineral substances capable of yielding bituminous matters, by the application of heat so as to thicken and improve such oils, and render them more suitable for lubricating machinery, and manufacturing wools.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *Improved machinery for printing.* (A communication.) Patent dated July 5, 1853. (No. 1603.)

Claim.—1. Mounting the chase on a rocking frame, or its equivalent, whereby the type may be carried forward to give the imprint, and be returned to a suitable position to be acted upon by the inking-rollers; and, 2. Mounting the inking-rollers in vibrating arms, or their equivalent, whereby they may be traversed over the face of the type when the chase is in its quiescent position.

MACKAY, GEORGE, of Buckingham-street, Strand, gentleman. *Improvements in the manufacture of glass.* (A communication.) Patent dated July 5, 1853. (No. 1604).

Claims.—1. Manufacturing plates of glass, by causing the glass, after having been formed by rolling or otherwise while in a plastic state, to pass between two or more pairs of rollers used for drawing and holding

the glass till cool enough to support itself. 2. Embossing the surfaces of plate-glass by passing it between embossing-rollers. 3. The polishing-rollers for polishing the glass before annealing. 4. The construction of the crown of the arch of a reverberatory glass furnace with an air-chamber or chambers, having downward openings to throw down the heat and vaporize materials, and thereby preserve the top of the arch, and increase the effect of the fires. 5. Suspending plates of glass by their upper edges, after they have been formed, while annealing, so as to keep them in a perfect plane, without resting on a bed.

Newey, Thomas, of Garbett-street, Birmingham, steel-pen tool-maker. *Improvements in fastenings for wearing apparel.* Patent dated July 6, 1853. (No. 1607.)

These improvements relate to "hook-and-eye" fastenings, and consist in producing the parts from sheet metal, the tongue of the hook being formed by cutting a portion from the body of it, and then stamping or pressing this portion into form to receive the eye, and hold it by spring pressure.

Erard, Peter, of Marseilles, France, civil engineer. *Certain improvements in steam boilers.* Patent dated July 6, 1853. (No. 1608.)

This invention consists in applying certain tubular apparatuses to boilers, for increasing their heating surface and economising fuel. These apparatuses are susceptible of being taken down for repairs without stopping the working of the engine, and both contain water; one of them is employed in lieu of a firegrate to support the fuel, the other is set at the top of the grate to receive the flame, and both serve to heat the water before it proceeds to the main boiler.

Fontainemoreau, Peter Armand Lecomte de, of South-street, Finsbury, London. *Improvements in typographical printing-presses.* (A communication.) Patent dated July 6, 1853. (No. 1609.)

Claim. — Certain mechanical arrangements for obtaining several different coloured impressions on the same side of a sheet of paper, by means of a cylinder holding the sheet in contact with its surface until all the said impressions are obtained, and employing as many forms as there are colours to be printed.

Hood, John, of Glasgow, Lanark, and William Hood, of the same place, manufacturers. *Improvements in the treatment or manufacture of ornamental fabrics.* Patent dated July 6, 1853. (No. 1610.)

This invention relates to that part of the manufacture of fabrics of the lappet class wherein the loose surface-threads, produced in forming the device, are cut from the piece to bring it to the finished state. In the inventors' process duplex cutting-scissors are used, being, in each case, composed of a central stationary blade, with a cutting edge on each side, and two other side-blades, with a single cutting-edge on the inside of each blade, to work in concert with the two edges of the central blade. Any ornamental fabrics may be treated by this process provided the device, being of the lappet-leaf or harness class, is made up of spots, or regularly-disposed isolated portions of interwoven weft.

Cook, William Woods, of Bolton, Lancaster, muslin manufacturer. *Improvements in the manufacture of woven or textile fabrics.* Patent dated July 6, 1853. (No. 1611.)

In an illustration which the inventor gives, in order to elucidate the principle of his invention, he employs two yarn beams, namely, a face-beam and a back-beam, the face-beam being plain, and the back-beam having flanges or list folds arranged on it, according to the design or pattern required for receiving the lining-threads of the folds or plaits, as well as for confining them in a proper position during the process of weaving.

Kennard, Thomas William, of Duke-street, Adelphi, Middlesex, civil engineer. *Improvements in iron bridges.* Patent dated July 6, 1853. (No. 1613.)

Claims.—1. Constructing the top rails of iron bridges of two plates or bars and four angle irons united or combined, as described. 2. Constructing the bottom rails of iron bridges of two flat plates or bars, or two series or sets of flat plates or bars, placed one above the other, with an interval between them, and connected by joint plates, and having joint pins for securing the struts and ties passing through the joint plates and through the interval between the two bars or sets of bars.

Bradshaw, James, and Thomas Dawson, of Blackburn, Lancaster. *An improved shuttle-skewer.* Patent dated July 6, 1853. (No. 1614.)

This invention consists—Firstly, in sinking or raising a spiral or circular groove, or in making any indentation in the skewer for the purpose of holding on the cop, and for facilitating the skewering thereof, so as to cause it to go on easy, and prevent the cop bottom being pressed up and the threads broken, thereby making less cop bottoms and waste, by avoiding the entanglement of the threads.

Rust, Robert Anderson, of Regent-street, Middlesex, pianoforte manufacturer. *An improvement in pianofortes.* Patent dated July 6, 1853. (No. 1615.)

This invention consists in making perforations in the belly, or sounding-board,

through which metal tubes, bent at their lower ends, are inserted, and are brought forward through hollow bars to the front of the sounding-board. These tubes are extended upwards through, or into the rest plank, and terminate in sound holes or apertures at the top of the instrument. The effect of these tubes will be to deepen and improve the tone considerably.

Woodward, John, of Platt-street, Middlesex, office clerk. *An apparatus for curling hair.* Patent dated July 6, 1853. (No. 1616.)

This invention consists of a curler formed out of a small sheet or piece of leather, India-rubber, gutta percha, or other suitable material, one end of which is rolled round a core of quill, wood, or other light substance, and secured to it by stitching or cement. A piece of elastic braid is passed through the core, having attached to it at one end a clasp, and to the other end a spring, fitting into the clasp, this braid being intended to keep the curler on the hair.

Newton, William Edward, of Chancery-lane, Middlesex, civil engineer. *Improvements in locks and latches.* (A communication.) Patent dated July 6, 1853. (No. 1617.)

The object of this invention is to produce a moderately safe lock that it would be difficult to pick, but which may be made at a low cost, and which can be opened with great ease without the proper key. In these improved locks the bolt is held by another bolt or stud, and cannot be shot either way until such additional bolt or stud is removed or turned back out of the way.

*** Nos. 1584, 1598, and 1602.—The specifications of these patents are not yet filed, in consequence of unavoidable delays which have taken place. Petitions for extensions for the time of filing each of them have been presented to the Lord Chancellor. When these petitions are replied to, we shall give abstracts of either the complete or provisional specifications, as the case may be.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH:

Jarman, John, of Manchester, Lancaster, commercial traveller. *Improvements in apparatus for measuring corn, pulse, seeds, or other produce usually sold by dry measure.* Patent dated June 28, 1853. (No. 1558.)

The inventor makes a graduated scale on an external groove or rim, placed round a solid or hollow substance made of metal, wood, or any suitable material; and places it on a stand so that the top circular rim or measure shall slide round, or may be shifted from one groove to the other when the quantity requires an alteration of the measure, the top rim or measure thus forming the receptacle of any given quantity, as marked on the graduated scale.

Brown, Alexander, of Glasgow, Lanark, North Britain, manufacturer. *Improvements in the manufacture of cotton fabrics for ladies' under dresses.* Patent dated June 28, 1853. (No. 1560.)

According to this invention, lappet and fancy weaving are combined with the ordinary plain and corded cotton grounds used at present for ladies' petticoats; that is, whilst the body of the piece is woven in plain corded cotton grounds, it is at the same time ornamented by lappet weaving, with or without open loom work.

Steiner, Frederick, of Hyndburn, near Accrington, Lancaster, Turkey-red dyer. *Improvements in the manufacture of wooden rollers or cylinders.* Patent dated June 29, 1853. (No. 1565.)

These improvements consist in cutting a log of wood transversely into shives or discs, varying in thickness according to circumstances, and in fixing or gluing the said shives or discs together in such wise that the grain of the wood of one shive or disc does not coincide with the grain of the adjacent shive or disc.

Patterson, John, of Beverley, York, engineer. *Improvements in machines for reaping and mowing corn, grass, and other crops.* Patent dated June 29, 1853. (No. 1567.)

Claims.—1. A cutting-apparatus, consisting of a bar having fingers or cutters fixed alternately above and below the same, and a moveable cutter passing between all the fingers; and cutting against both edges of them. 2. A mode of suspending the moveable cutter at each end of it, and of stretching the same by means of a tension-rod or other convenient means. 3. The suspension of the cutting-apparatus by hinges from the frame of the machine, so that it is independent of the oscillation of the machine when it passes over rough or uneven ground. 4. A manner of assisting the delivery of the corn by means of a fence or roller placed behind the cutters, and the removal of it from the platform by self-acting endless rakes, or similar means. 5. A method of steering the machine, in which the beam or pole (through which the power of the horses is transmitted) is attached to the frame of the machine by a bolt or pivot upon which it can revolve freely. 6. The having only one wheel to carry the weight of the working portion of the machine, but with two trailing wheels fixed to the pole or beam, and placed behind the horses, as well to bear the weight of the beam as to prevent the machine from being upset.

SICARD, PIERRE AMABLE DE SAINT SIMON, of Paris, chemist. *Improvements in apparatus for facilitating the raising, moving, and breaking up of sunken vessels and other submerged substances.* Patent dated June 29, 1853. (No. 1571.)

This invention consists of a method of connecting chains or cables to submerged bodies by means of screws, which, when sunk below the water, are caused to penetrate the substance by having motion communicated to them from the surface.

WRIGHT, LEMUEL WELLMAN of Chalford, Gloucester, engineer. *Improvements in the permanent way of railways.* Patent dated June 29, 1853. (No. 1573.)

These improvements consist in a peculiar construction of rails and sleepers, and in a manner of fitting them together so as to maintain the parallelism of the lines of rails; and also in the mode and manner of adjusting the rails with facility, so as to keep a uniform level.

WEBB, JOSEPH of Mayfield-terrace, Dalston, Middlesex. *Improvements in obtaining and applying motive power.* Patent dated June 30, 1853. (No. 1577.)

This invention consists in the use of gas, and of electricity for the purpose of exploding the gas within the cylinder of a steam engine, and thereby creating an elastic force or power to be used as a motive power in lieu of steam or any other power hitherto employed.

STERRY, GEORGE, of Worcester, carver and gilder. *An improved method of producing designs and patterns in wood.* Patent dated June 30, 1853. (No. 1578.)

The inventor takes pieces of wood, of various colours and forms, according to the pattern to be produced, and mounts them all in a frame, side by side, in the direction of their length. He then removes the frame, and glues each piece of wood to that next it, and presses the whole together on all sides by means of a binding hoop or frame, or by means of cords bound tightly round the whole mass. When the glue has set, he cuts off transverse veneers in slices, all of which will bear the same uniform pattern, and applies them as a veneer or inlay to the articles to be ornamented.

HOW, ANDREW PEDDIE, of Mark-lane, London, engineer. *An engine-meter or instrument for indicating the number of strokes of an engine* Patent dated June 30, 1853. (No. 1579.)

This invention consists in constructing an apparatus for indicating the number of strokes of a steam or other engine, in which the numbers are read off in a straight line. Inside a box a series of wheels are mounted, each wheel being marked with figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, and so connected that the unit wheel is caused to move ten times to one motion of the tens-wheel, while that moves ten times for one motion of the hundreds wheels, and so on up to any required number in the series. These registering wheels are worked by a ratchet or other suitable contrivance connected to some moving part of the engine.

PARSONS, GEORGE, of West Lambrook, Somerset, agricultural implement maker. *Improved machinery for threshing, winnowing, and dressing corn, grain, and seeds.* Patent dated July 1, 1853. (No. 1586.)

The object of this invention is to construct a portable machine for performing the several operations of threshing, winnowing, screening, elevating, and separating corn, grain, and seeds. The threshing-drum is provided with five beaters, with tangential strips, by which a current or draught of air is produced. The straw is delivered in the usual way on a shaker, and the corn and chaff, in falling through the concave or roof to the riddle, is met by a current of wind generated by one of the inventor's patent disc-shaped blowers, which carries the chaff away before it.

DE BERGUE, CHARLES, of Dowgate-hill, London, engineer. *Improvements in the manufacture of railway wheels.* Patent dated July 4, 1853. (No. 1594.)

These improvements are applicabe only to wheels made with ribbed or feathered tyres, and consist in manufacturing the frame or body of the wheel in the form of a solid or perforated plate or disc (either in one or more part or parts, and either with or without strengthening ribs or feathers), and supporting and securing the tyre thereto, by fitting the frame or body to one side of the rib or feather of the tyre, and riveting or bolting the two together.

FEVRE, GABRIEL DIDIER, of Paris, France. *An improved vessel to be used for the purposes of infusion and decoction, heating liquids, and melting glutinous substances.* Patent dated July 4, 1853. (No. 1595.)

This improved vessel consists of an enamelled metal cylinder, in the centre of which is a smaller cylinder, the upper part of which is covered with wire gauze, and underneath it is placed the lamp or heating-apparatus, which is so proportioned to the size of the vessel that the heat expires as soon as the object desired is obtained.

PARRATT, GEORGE FREDERICK, of Piccadilly, Middlesex. *Improvements in portable bridges, rafts, or pontoons.* Patent dated July 4, 1853. (No. 1597.)

This invention consists in the employment of air-tight flexible tubes in combination with a system of cross bars, the air-tight tubes giving buoyancy to the whole apparatus, and the system of cross bars

offering a roadway, or supports for a roadway.

Poole, Moses, of Avenue-road, Regent's-park, Middlesex. *An improved quartz-crushing, pulverizing, and amalgamating machine.* (A communication.) Patent dated July 5, 1853. (No. 1605.)

This invention consists in the use of a cast-iron oblong trough, arranged in a frame, in which a heavy cast-iron ball is made to roll backwards and forwards by means of a connecting-rod attached to a crank, and driven by any suitable power.

Biddell, George Arthur, of Ipswich, engineer. *Improvements in apparatus for crushing grain, seeds, or pulse.* Patent dated July 5, 1853. (No. 1606.)

This invention consists in so arranging the rollers of mills or apparatus for crushing grain, seeds, or pulse, that at starting they shall be caused to revolve simultaneously.

Gaskell, Peter, of Manchester, Lancaster, manager. *Improvements in elastic springs.* Patent dated July 6, 1853. (No. 1612.)

For a spring to support any given weight, as a carriage body, the inventor proposes to take a solid bearing of wood, metal, or any convenient material, and cut it across in or about the centre, then to bore a hole in one of the said parts and fix to the other part a plug to fit into the said hole, and then to fill the hole partly with India-rubber or a similar elastic substance, so that the plug or pin being put into the hole, and the body to be supported being fixed on the top of the said bearing, it will spring in the hole by the elastic force of the substance.

PROVISIONAL PROTECTIONS.

Dated August 18, 1853.

1906. John Gwynne, of Essex-wharf, Essex-street, Strand, Middlesex, gentleman. Improvements in the preparation of a black powder from coal, and the application thereof to the manufacture of paints, blacking, and various other purposes.

Dated November 29, 1853.

2776. Edward Joseph Hughes, of Manchester, Lancaster. An improved method of purifying and concentrating the colouring matter of madder, munjeet, spent madder, or any preparations thereof, however they may be made.

Dated December 22, 1853.

2974. Louis Adolphe Ferdinand Besnard, of Paris, France. A new system of painting, by means of lithography, without leaving a particle of paper upon the canvass.

2976. William Henry Woodhouse, of Parliament-street, Westminster, civil engineer. Improvements in the construction of roads, ways, and ducts.

2978. Benjamin Murgatroyd, of Bradford, York, dyer. Improvements in washing or scouring wool, alpaca, and mohair, and fabrics composed entirely or partly of those materials.

2980. James Gibbons, the younger, of Wolverhampton, Stafford, lock-manufacturer. Improvements in locks and latches.

Dated December 23, 1853.

2982. John Gillow, junior, of Northwich, Chester, salt-proprietor. Certain improvements in the manufacture of salt.

2984. John O'Neil, of Bury, Lancaster, manager. An improvement in apparatus for drawing condensed steam and air from pipes or other chambers in which steam is used.

2986. Jean Daniel Pfeiffer, of Paris, France, gentleman. Improvements in machinery or apparatus for cutting paper and similar materials.

Dated December 24, 1853.

2988. Joseph Gaultier, of Paris, France, gentleman. An improved apparatus for washing and bleaching.

2990. Joshua Margerison, of Preston, Lancaster, agent. Improvements in railway breaks.

2992. Gustav Adolph Buchholz, of Gould-square, Crutched-friars, London, civil engineer. Improved machinery for the cleaning and hulling or dressing of rice, wheat, and other grain.

2994. Thomas Cooper, of Leeds, York, bookbinder. An improvement applicable to the binding of ledgers and other books.

Dated December 27, 1853.

2998. George Josiah Mackelcan, of Lechlade, Gloucester, agricultural-implement maker. Improvements in winnowing or corn-dressing machines.

3000. Thomas Symes Prideaux, of St. John's-wood, Middlesex.. Improvements in apparatus for regulating the supply of air to furnaces, and for preventing radiation of heat from fire-doors and other parts of the fronts of furnaces.

Dated December 28, 1853.

3002. John Parkinson, of Bury, Lancaster, brass-founder. Improvements in governors for regulating the pressure of steam, gas, and other fluids or liquids.

3004. James Taylor, of the Britannia Works, Birkenhead, Chester, engineer. Certain improvements in raising and lowering weights.

3006. Joseph Alexis, of Avignon, France. An improved railway break.

3008. John Macintosh, of Pall Mall East, Middlesex. An improvement in discharging projectiles.

3010. Francis Parker, of Northampton. An improvement in the manufacture of gaiters.

3012. Duncan M'Nee, printer, of Hillfield, Kirkintilloch, Dumbarton, and Alexander Broadfoot, merchant, of Ingram-street, Glasgow, Lanarkshire. Improvements in printing with colours on cloth, which are also applicable to printing ornamental designs on paper or other surfaces.

Dated December 29, 1853.

3014. Henry Jackson, of High-street, Poplar, Middlesex. Improvements in machinery for moulding bricks and other articles of brick-earth.

3016. Mary Phillips, of Birmingham, Warwick, widow. Improvement or improvements in metallic revolving or winding shutters. A communication from her late husband.

3018. James White, of East-street, Red Lion-square, Middlesex, engineer. Improvements in friction-joints or fastenings.

3020. Claude Alphonse Roux, of Belleville, near Paris, France. Improvements in printing warps of cut pile and similar fabrics.

3022. Alfred Vincent Newton, of Chancery lane, Middlesex, mechanical draughtsman. Improvements in the manufacture of screws. A communication.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

3032. Chrétien Guillaume Schönherr, of Chemnitz, Saxony, mechanical engineer. Improvements in bobbin-machines. December 31.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January 6th*, 1854.)

1777. William Edward Newton. Improvements in depositing metals or alloys of metals. A communication.

1804. William Henry Clarke. Improvements in the manufacture of a composition resembling papier-maché and carton pierre, and applicable to the same purposes to which papier-maché and carton pierre are applied; parts of which invention may also be applied to the construction of ships and boats and roofing. A communication.

1841. Richard Bartholomew Martin. An improved plate-warmer.

(*From the "London Gazette;" January 10th*, 1854.)

1902. John Gwynne. Improvements in the preparation of beet-root for the manufacture of sugar, which improvements are also applicable to the preparation of other vegetables.

1906. Hesketh Hughes. An improved method of producing cut and fancy patterns in velvets, silks, and other textile fabrics.

1937. William Cornelius. Improvements in gilding porcelain, glass, and such like materials. A communication.

1950. William Schmollinger and Edward Grainger Smith. Improvements in the means of converting reciprocating or rectilinear motion into rotatory motion.

2000. Joseph Cundy. Improvements in kitchen-ranges and cooking-apparatus.

2003. Peter Armand Lecomte de Fontainemoreau. Certain improvements in the production of electricity. A communication.

2015. Ezra Washington Burrows. Improvements in the construction of cranes and other machines for raising heavy bodies.

2019. Edward Smith. An improved mode of manufacturing carpets.

2038. Albert Nagles. Certain improvements in machinery or apparatus for washing, bleaching, dunging, and dyeing woven fabrics.

2202. James Grafton Jones. Certain improvements in the means of conveying signals or intelligence from one part of a railway train to another.

2233. Thomas William Kennard. Improvements in constructing piers and foundations under water.

2241. Caleb Bloomer. Improvements in the manufacture of anchors.

2283. Joseph Henry Cary. An improved pianoforte action for upright pianofortes.

2462. Alfred Vincent Newton. An improved construction of railroad-carriage axle. A communication.

2514. George Hamilton. Improvements in spreading or distributing starch, gum, and other semi-fluid matters.

2651. James Wills Wayte. Certain improvements in self-feeding furnaces.

2695. Emanuel Wharton. Improvements in the manufacture of railway wheels.

2751. Auguste Edouard Loradoux Bellford. Improvements in rotary engines. A communication.

2758. Georges Edouard Gazagnaire. Improvements in the manufacture of nets for fishing and other purposes.

2776. Edward Joseph Hughes. An improved method of purifying and concentrating the colouring matter of madder, munjeet, spent madder, or any preparation thereof, however they may be made.

2817. John Gwynne and James Egleson Anderson Gwynne. Improvements in the manufacture of fuel, its preparation, and applications for the reduction of ores, fusing, and refining metals, cementation, or making steel, and treating salts. Partly a communication.

2848. Benjamin Solomons. Improvements in telescopes and other glasses in their application to the measurement of distance.

2867. Frederick Osbourn. Improvements applicable to the distribution of manure.

2871. William Schaeffer. Improvements in purifying spirit.

2906. Samuel Messenger. An improvement or improvements in railway, ship, and carriage-lamps.

2930. Samuel Smith. Improvements in preparing rovings and yarns of wool.

2960. Emile Victor Felix Lemaire. Improvements in tanning.

3000. Thomas Symes Prideaux. Improvements in apparatus for regulating the supply of air to furnaces, and for preventing radiation of heat from fire-doors and other parts of the fronts of furnaces.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

NOTICE OF APPLICATION FOR PROLONGATION OF PATENT.

A petition will be presented to Her Majesty in Council, by Alexander Angus Croll and Richard Laming, of Millwall, Poplar, in the county of Middlesex, William Daniel Owen, of the same place, and Herman Dirs Mertens, of the same place, manufacturing chemists, praying Her Majesty to grant a prolongation of the term of the letters patent granted to Alexander Angus Croll, Superintendent of the Chartered Gas Company's Works in Brick-lane, Middlesex, dated 29th July, 1840, for "certain improvements in the manufacture of gas for the purpose of illumination, and for the preparation or manufacture of materials to be used in the purification of gas for the purpose of illumination."

On the 28th January an application will be made to the Judicial Committee of Her Majesty's Privy Council, to fix an early day for the hearing of the matters contained in the said petition; and any person desirous of being heard in opposition, must enter a caveat to that effect in the Privy Council Office, on or before that date.

WEEKLY LIST OF PATENTS.

Sealed January 6, 1854.

1607. Thomas Newey.
1616. John Woodward.

1628. William Robertson.
1633. Philippe Poirier de St. Charles.
1636. Ewald Riepe.
1696. Jean Baptiste Jelie.
1711. Donald Brims.
1806. Peter Armand Lecomte de Fontainemoreau.
2042. John Clare, junior.
2236. James Willis.
2388. George Frederick Chantrell.
2468. John Fordred and Thomas Boyle.
2480. Thomas Dunn and William Gough.
2632. William Hadfield.
2636. Matthew Gray.

Sealed January 9, 1854.

1637. Ewald Riepe.
1641. Pierre Auguste Tourniere and Louis Nicolas de Meckenheim.
1653. William Levesley.
1736. William Huntley.
1757. Thomas Banks and Henry Banks.
1785. Peter Armand Lecomte de Fontainemoreau.
1919. William Hunt.
1961. William Rettie.
2065. Robert Harrington.
2601. James Atkins.
2609. Alexandre André Victor Sarrazin de Montferrier.
2613. Richard Dryburgh.
2621. Johan Martin Levien.

Sealed January 11, 1854.

1645. George Ager.
1650. George Dalton.
1651. Felix Lieven Bauwens.
1652. Joseph Bacon Finnemore.
1658. James Fletcher.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Proprietor's Names.	Addresses.	Subject of Design.
Dec. 31	3544	G. W. Reynolds	Birmingham	Gaiter-fastener.
1854.				
Jan. 2	3545	Holden and Nicholas	Birmingham	Shot-charger.
,,	3546	W. Meyerstein	Friday-street	Sofa-bed.
3	3547	H. Hill & R. Millard	Dungannon-street	Chair-arm.
6	3548	Dent, Allcroft, & Co.	Wood-street	Windsor-cravat.
7	3549	J. D. Potter	Poultry	Parallel-rule.
,,	3550	Hammond, Turner, & Son	Birmingham	Button.
,,	3551	Hammond, Turner, & Son	Birmingham	Metal button.
10	3552	Stock and Son	Birmingham	Water-closet.

WEEKLY LIST OF PROVISIONAL REGISTRATIONS.

Nov. 14	544	A. N. Dare	Piccadilly	Collar.
19	545	G. & S. Gower	Ipswich	Shirt-front.
21	546	G. H. Wain	Liverpool	Pulley-block.
,,	547	F. Clark	Whitehall	Pipe-tube.
22	548	C. Rowley	Birmingham	Button-shank.
24	549	G. Sivers	Bingley	Sash-plane.
29	550	J. Wren	Tottenham-court-road	Chair-bedstead.
Dec. 7	551	R. P. Hopkins	Wimbourne	Lamp.
8	552	T. Trotman	Camden-town	Child's carriage.
24	553	T. Trotman	Camden-town	Chariot.
1854.				
Jan. 7	554	J. Duffett	Bristol	Indicator.

NOTICES TO CORRESPONDENTS.

An Inventor.—Wilson and Lee's patent for "Improvements in the manufacture of Night-lights and their Cases," was sealed, and the final specification of it was duly filed. For a brief abstract of it see *Mech. Mag.*, vol. lix., page 295.

A Patentee, London. We are obliged to you for the hints with which you have kindly favoured us. It is impossible for *us* to give all the claims of patentees *verbatim*, as they are frequently very tautological, and far too long to be literally quoted. You can always, however, obtain exact copies of the claims of any particular specification by applying for them at our office. We shall take your suggestions respecting the half-yearly alphabetical list of patents into serious consideration.

N. S.—We thank you for your second letter. If you can restrict the number of sketches to a few, and accompany them with suitable observations, we shall be happy to receive them; the subject being one upon which much misunderstanding at present exists, even among those persons who might naturally be considered well-informed on such matters.

J. M., Temple.—We regret that we cannot insert your letter in the present Number, as it came too late to afford us sufficient time for getting the figures engraved. It shall be published in our next.

J. B. asks, "whether vacuum has the power of *drawing* or *suction*; and, if so, to what extent?"

also, "whether it is used as a motive power?" A vacuum is neither a *source* nor a *residence* of power. On the contrary, it is the *absence* of power in a vacuum that gives rise to those phenomena which lead unscientific persons to ascribe suction to it. All terrestrial, and, indeed, all existing substances, are acted upon by pressures which, when unbalanced, or unresisted, communicate motion to such substances. Hence, when access is given to the interior of a rigid vessel, within which is a vacuum, the atmosphere or other surrounding fluid rushes into it, *not* in consequence of any drawing or sucking quality possessed by the vacuum, but because the latter is incapable of resisting or balancing the forces already acting upon the fluid. From these observations it evidently follows that a vacuum cannot be employed as a motive power. Nevertheless, it is a very common practice to form a vacuum in motive-power engines, the object being to reduce the resistance opposed to the moving forces generated. The common condensing steam engines are examples of this; but the atmospheric railway is perhaps the best instance we can refer to.

G. Pere, Birmingham. Gutta percha is very well suited for making moulds for electro-metallurgical purposes. The following passage occurs in Tomlinson's "Cyclopædia of the Useful Arts." "This substance (gutta percha) must be made soft and pliable by being heated in boiling water or in air at that temperature: the medal must be fitted with a metallic rim, and a quantity of the softened gutta percha forced upon it until it stands above the edge of the rim; it is then placed in a common copying press, and kept under pressure until it is quite cold and hard. The impressions taken in this way are usually very fine, all the deep parts being represented in a manner superior to those taken in wax."

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Mechanics' Magazine.

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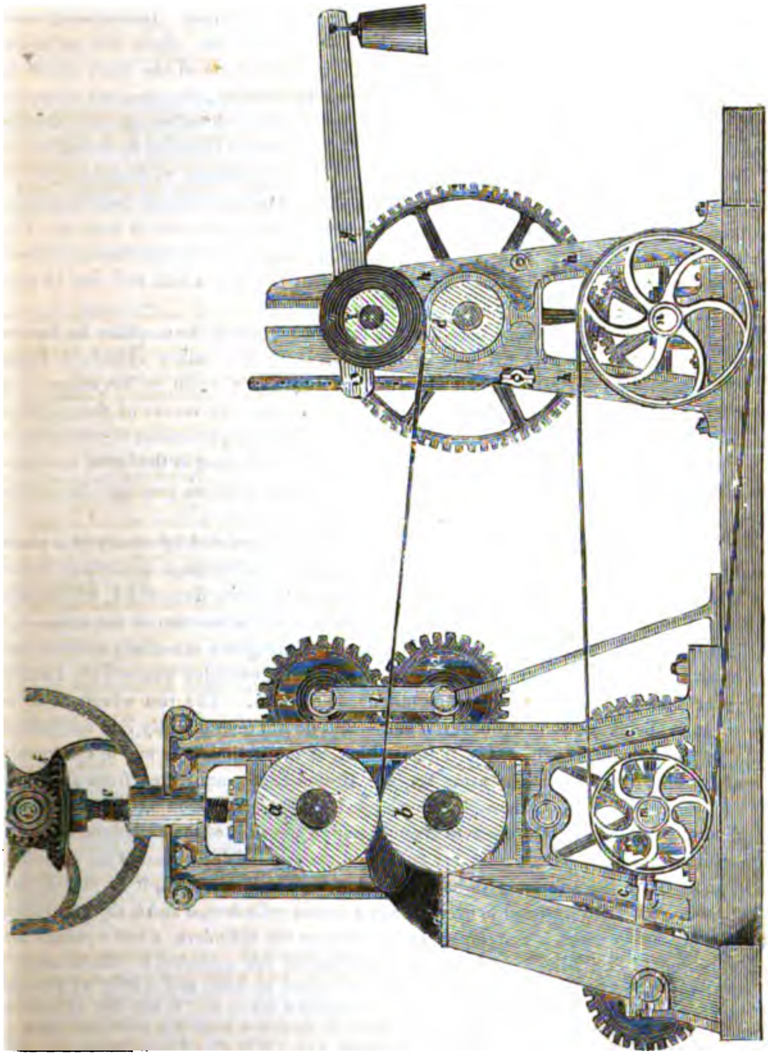
Edited by R. A. Brooman, 166, Fleet-street.

PERRONCEL'S PATENT MACHINERY FOR MANUFACTURING CAOUTCHOUC.



PERRONCEL'S PATENT MACHINERY FOR MANUFACTURING CAOUTCHOUC.

(Patent dated July 2, 1853.)

THE object of the first part of M. Perroncel's invention is to produce a compact cylinder or roller free from air-bubbles. The caoutchouc is accordingly first freed from impurities and foreign matters by any process now adopted for such purpose, and is then fed in between two iron cylinders or rollers heated by currents of steam, hot water, or other heating medium. The rollers are caused to revolve and give out on the opposite side a thick sheet of caoutchouc, which is led on to a small roller termed the gathering-roller, the axis of which is free to rise in a slot in the frame of the apparatus, while it is prevented rising too rapidly by means of a weighted lever pressing on the upper surface thereof. Immediately under this gathering-roller is a hollow fixed roller, heated in the inside. Both the gathering-roller and fixed roller are caused to revolve, and the caoutchouc winds itself round the upper or gathering-roller in the form of a solid mass or cylinder; the pressure exerted on the gathering-roller, together with the heat from the fixed heated roller, causing adhesion between the several thicknesses; at the same time, the pressure forces or squeezes out any globules of air that may exist in the caoutchouc. When a cylinder of sufficient size has been thus obtained, it is transferred to another machine, together with the gathering-roller, or it may be mounted upon a separate axis. It is then caused to revolve in front of a fixed knife or blade, which slices or cuts off a continuous length of the caoutchouc in sheets varying in thickness with the setting of the knife, which slides in a bed, and can be regulated as required.

The engraving on the preceding page shows a vertical section of the machine for forming the caoutchouc into a compact cylinder or roller. *a b* are two hollow cylinders, having their bearings in the side frames, *c c*. They may be heated by steam or hot water, or by iron or other substance previously heated, and introduced into the centre of the cylinders. The bearings of the cylinders, *b d*, revolve always at a fixed height—those of the cylinder, *a*, are held down by the pressure-screws, *e*, which work through nuts in the top of the frame. The screws, *e*, each terminate at top in a pinion, *f*, the teeth of which gear into two endless screws mounted on the shaft, *g*.

The distance between the two cylinders, *a* and *b*, can be regulated by means of a crank-handle fitted to the shaft, *g*. The cylinder, *d*, is supported in bearings in the side frames, *h h*. The axis of the cylinder, *i*, revolves in slots in the side frames, *h h*, which allow it to rise and fall, and also to revolve when set in motion by the rotation of the cylinder, *d*. In order to insure the two cylinders, *a* and *b*, always revolving at a constantly uniform rate, whatever may be the distance between them, the inventor provides four wheels, $k\ k\ k^1\ k^2$, which gear into each other, and are mounted in bearings. The two wheels, *k k*, are mounted upon the axes of the cylinders, *a* and *b*, and do not gear directly into each other; but do so through the wheels, $k^1\ k^2$. Thus neither of the cylinders, *a* and *b*, can revolve without the other revolving at the same speed. Motion is communicated from any prime mover to the cylinders, *b d*, through the coupled shafts, *m n*, which are provided with toothed wheels which gear into other toothed wheels on the axes of the cylinders, *b d*.

The manner of working the machinery so as to form a cylindrical piece of caoutchouc is as follows.—When the substance to be treated has been well cleansed, it is placed on a feeding-table a^1, and fed into and between the two heated cylinders, *a* and *b*, the caoutchouc is thus formed into a sheet, which, on being led between the cylinders, *d* and *i* (which may be also heated if desired), is rolled or wrapped round the cylinder, *i*. Each sheet of caoutchouc adheres to the preceding, partly by the effect of heat, and partly by pressure exerted upon the cylinder, *i*, by means of the weighted lever, *y*. When the cylindrical mass of caoutchouc, *o*, attains the desired size, it is removed from the machine, with its gathering-roller, and transferred to the machine, by which it is sliced into sheets.

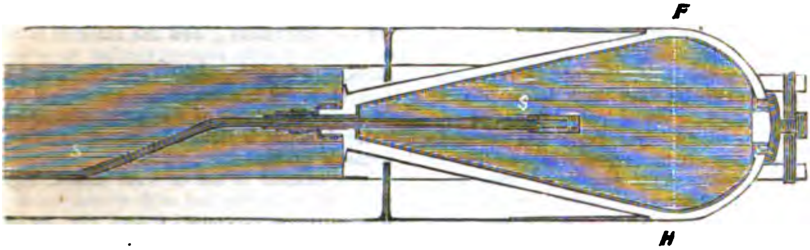
A NEW SYSTEM OF NAVAL WARFARE.

BY JAMES DUNBAR, ESQ., OF DORRERY, THURSO.

(*Concluded from page* 31.)

From numerous experiments performed in military engineering, with small shells in destroying massive stockades, it is certain that a comparatively small shell exploded in perfect contact with a ship, below water, will produce a breach that will immediately sink it. The qualities requisite in such a shell are—that it be of great strength, to increase the power of the explosion; that its form be such as to direct the whole force of the explosion upon the part of the ship in contact with it; and that none of its effect extend to the vessel applying it. The construction of a shell on these principles will be understood by figs. 4, 5, and 6 of the accompanying engravings, where fig. 4

Fig. 4.



represents a longitudinal section of such a shell, with part of its attached shaft. Fig. 5, a transverse section of the shell at the line, F H. Fig. 6, a transverse section of the shaft; and *s s*, insulated wires for exploding the shell.

The shell is to be of brass, of a conical form, with a hemispherical end in front; its exterior diameter at the largest end to be 2 feet, at the small end 7 inches, by 3½ feet in length, or, including the hemispherical end, 4½ feet; and the thickness of the metal to be 1 inch in the hemispherical end, gradually increasing to 2 inches at the breech or small end. In the front or fore end is an aperture for introducing a gutta percha case for containing the powder, and by which the shell is to be charged; this is to be shut by an iron plate attached to

Fig. 5.

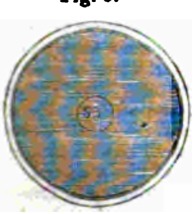
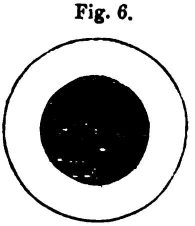


Fig. 6.



keepers in the end of the shell by a massive iron bar, and made water-tight by a screw pressing on its centre. The breech end to have a small flange round it, and to be covered with a wooden cylinder firmly hooped upon it, and retained in its place by the flange. At the breech projects a short metal tube, through which is to pass a gutta percha tube from the interior case, containing the connecting-wires, all of which must be properly secured by compresses so as to be perfectly water-tight. From the conical form of the shell, and the thickness of the metal at the breech, the whole force of the explosion will be directed towards the wide end or front, and consequently upon the portion of a ship in contact with it. The shell will contain 8,740 cubic inches, or 290 lbs. of powder, exclusive of the interior case; and its total weight, when charged, will be about 1,430 lbs., or nearly 13 cwts. From its immense strength, its explosion will be fully sufficient to form a breach that will rapidly sink any ship in contact with it.

It is evident that the entire success of the shells wholly depends upon preventing their effect from extending to or damaging the steamer employed in applying them. To effect this, each shell is to have a long hollow shaft of wood attached to it, which shaft is to project below water from the stem of the steamer to a length of 8 or 9 yards: the space of water intervening between the shell and vessel will effectually protect the latter from being damaged by the explosion. As these shells are to act when struck against ships, they may be designated "Collision Shells," to distinguish them from the other kind, which may be termed galvanic. Collision shells can

only be applied by steamers constructed for that purpose alone, no kind of vessel at present in use being capable of applying them in any circumstances whatever.

The principal qualities necessary in a steamer adapted to this purpose are, that it be of sufficient strength to resist the collisions to which it will be liable; that its sides be sufficiently thick and solid to resist the heaviest artillery, in order that it may not be sunk, and to protect the machinery; that its deck be bomb-proof against the heaviest shells, and so well defended that the enemy cannot gain possession thereof; and finally, that it be of the greatest attainable velocity, in order that it may rapidly overtake other vessels. In such a vessel, the first thing to be considered is its size, and this must be determined by the consideration that its sides must be at least 4½ feet thick, in order to resist shot and preserve the machinery. From this cause, its dimensions cannot properly be less than as follows: — Extreme length of the upper deck, 250 feet; extreme breadth, 36 feet; depth at the stem, 32 feet, and at the stern, 33 feet, of which 11 feet is to be above water throughout its whole length. Its draught of water will thus be 22 feet at the stern, and 21 feet forward; which great depth, in proportion to the breadth of the vessel, is necessary, in order that there may be a sufficient depth of water over the screw propeller to protect it from shot. The vessel is to be formed on the model of the swiftest steamers, and built in the most solid and substantial manner of the best oak or teak. The ribs or cross timbers are to be placed close together, without any intervals between them, and to be 15 inches thick above water, as well as below it; and their upper parts, commencing at 6 feet below water, are to curve inwards more than those of any other ship, in order to allow the necessary thickness to be given the sides outside the ribs, without impairing the form of the vessel. All the upper part of the vessel, to a depth of 18 feet from the top, or 7 feet below water, is to be lined with a fold of oak beams, 15 inches thick, placed longitudinally on the interior of the ribs, to which each course of them are to be securely bolted before the exterior planking is put on; and the latter should be 6 inches thick on the bottom up to the commencement of the interior lining, from which it will gradually increase in thickness to 1 foot near the surface of the water. The stem and stern should have several massive beams placed parallel to their respective posts, and the interior lining there should be thicker than in any other part; this will strengthen the extremities, and permit them to be more firmly bolted together than they otherwise could. The whole exterior of the upper part of the vessel to a depth of 13 feet, or 2 feet below water, is to be sheathed with a fold of oak beams, 18 inches thick; making the entire thickness of the sides above water 4½ feet. This thickness is necessary to resist cannon, and, if required, the sides of the engine-room may be thicker. The beams forming the exterior sheathing must be firmly attached to the sides by screw-bolts passing through the exterior planking, the ribs, and interior lining, and secured inside by nuts, in order that the sheathing may be easily replaced when shattered by shells and shot. The bottom is to be strongly trussed, especially under the boilers and machinery; and the exterior is to be sheathed with copper similar to other ships. Including the exterior wooden sheathing, the breadth of the vessel will be 38 feet; but as that is almost wholly above water, it is not included in the dimensions formerly given.

The steamer is not to have masts, rigging, or bulwarks, as such would be destroyed in engagements; and the upper deck is to be level with the sides throughout its whole extent, and clear of all obstacles, in order that it may be properly defended. Both sides of the vessel are to be connected by oak beams, 18 inches deep, on which the deck is to be laid. The upper deck is to be formed of oak beams, 18 inches square, placed close to each other, and attached to the beams extending under it by screw-bolts, secured inside by nuts, in order to facilitate repairs. Besides resisting the heaviest shells, the upper deck will greatly strengthen the vessel, and enable it to sustain the most violent collisions without injury. The stern of the vessel is to project almost horizontally, at the surface of the water, over the rudder, to prevent that being damaged by ships running against it, and to protect the shaft from shot. The stern must be full and round, to afford room for the rudder to be wrought; and the shaft of the latter should be more massive than ordinary, and may pass through a stuffing-box to prevent any water from entering the vessel. Over the screw propeller there must be a depth of 5 or 6 feet of water to protect it from shot. The stem and stern should be of great thickness, and strongly bound with iron, and have several small ports, from which a full view of all objects in front and rear of the steamer will be obtained.

There is to be but one chimney or funnel for the escape of the smoke, and as it must be proof against the heaviest ship artillery, its height should not exceed 10 or 12 feet above deck. It is to be built of 12 folds of 1 inch iron plates, of the best quality, firmly rivetted together; and round the bottom

there is to be a broad projecting flange, by which it is to be securely bolted to the deck. To prevent the ball-proof chimney from getting hot, the flue from the furnace must be continued up through it, at a small distance from its sides; and its height may be increased by an additional tube when the vessel is not in action. The hatchways of the upper deck should be closed by shutters, of the same thickness as the deck. Nearly over the boilers there is to be a large opening, to admit of their being raised out of the ship when necessary, without breaking up the deck for that purpose. This opening to be shut by a detached portion of deck of the same thickness as the rest, and the beams extending under it to be attached to strong iron brackets projecting from the sides, to admit of their removal when necessary.

The lower deck is to extend the whole length of the vessel, at a height of 2 feet above water, and is to contain the guns and accommodate the crew. Between it and the upper deck is a height of 7½ feet, being 6 feet under the beams of the latter. The hold below it is to be divided by bulkheads into several water-tight compartments, of which those next the engine-room, for containing fuel, should be of small size. When the fuel in a compartment is consumed, a quantity of water equal in weight to the coal it contained must be let into it, in order that the vessel may always stand at the proper height above water during engagements: at other times this would not be necessary.

All the ballast is to consist of cast-iron, and must be arranged in such a manner as to prevent the steamer from rolling or pitching more than a masted vessel; and is to be attached to the wood-work, so as not to be displaced by collisions. The vessel being of the most solid construction, without sails or rigging, will not be so liable to be set on fire as other ships; and to prevent any danger on that account, there should be one or two powerful forcing-pumps, by which large quantities of water can be thrown upon the deck, and admitted to the sides by small vertical perforations.

The upper deck being perfectly level and clear of all obstacles, is to be defended in the following manner: Its length is to be divided into four or five portions of as equal extent as circumstances will permit, and in the centre of each part a hollow wrought-iron cylinder is to be fixed in the middle of the deck, forming an aperture of 1 foot in diameter. Surrounding each aperture a circular iron plate, 6 feet in diameter by 4 inches or 5 inches thick, is to be partly sunk in the wood, and securely attached to the deck by a number of bolts. Through these apertures cylindrical shells are to be raised above the deck, which, on being exploded, will effectually clear it of the enemy, and prevent all attempts at boarding. The massive plates round the apertures will prevent the explosion of the shells from injuring the deck; and, if necessary, there may be other plates round the former, so as to increase their diameter to any extent that may be required. The shells are to be of a cylindrical form, with flat ends, 1 foot in diameter by the same in height, and their interior 8 inches by 8 inches. To the base of each a block of wood of the same diameter, and 2 feet in length, is to be fixed by bolts proceeding from the shell; which blocks are to remain in the apertures after the shells are exploded, until forced out by the next that is raised. The upper deck is to be strengthened by additional transverse beams at the apertures; and under each a massive beam is to extend across the vessel, at the level of the lower deck, the ends of which must be strongly attached to the sides; and on these beams are to be placed the posts for sustaining the shells when fired. When the shells are elevated above deck, their attached blocks are to rest upon thick posts placed on the transverse beams, so that the downward force of the explosions may not be sustained by the deck. They are not to be raised above deck until the vessel is boarded; for if elevated before, then they would be exposed to shot. They may be fired either by percussion or galvanism; the latter, however, is preferable, as no accidents can occur from it. When not in action, the deck may be surrounded with strong netting instead of bulwarks.

The vessel is to be armed with ten or twelve short guns of large calibre; and the number of crew necessary to manage it and to work the guns need not, in any case, exceed 160 men, for none will be required to defend the upper deck, as no ship will attempt to board it when aware of its means of defence.

As it is necessary that the steamer should be propelled with the greatest velocity, in order that it may rapidly overtake other vessels, its engines should be on the high pressure principle, of 450 horse power, but capable of being worked up to 1,000 horse power when necessary. The boilers and all the machinery should be of the best workmanship, and more massive than ordinary; and the whole must be so firmly attached to the vessel, that no part of it will be displaced or injured by the most violent collisions that can occur. As the chimney must be ball-proof it cannot be of large size, and therefore all the fuel must consist of coke, which produces little smoke

and will require but a small funnel. By using Stevens' patent smokeless furnaces coal may be used in addition to coke, and a small chimney will be sufficient.

When immersed to its proper depth the vessel will displace about 98,000 cubic feet or 2,800 tons of water; and its total weight, including boilers, machinery, guns, and ballast, will amount to about 2,100 tons, thus making its net burden 700 tons, of which 520 tons may be fuel for the engines, and the remainder, shells, ammunition, water, and stores for the crew. For long voyages an additional quantity of fuel can be taken.

In the stem of the vessel, at a depth of 7 feet below water, there is to be inserted a strong brass tube of 24¼ inches interior diameter, and of such length as to extend through the entire thickness of the stem, in which it is to be firmly fixed. Its exterior end to have a broad flange around it, to prevent its being pressed into the vessel by any force whatever; and in its interior end, within the vessel, there is to be a stuffing-box, with elastic stuffing, through which the shells, with their shafts, are to pass. A small part of the stem round the flange should be strongly sheathed with iron plates, to protect it during collisions. In front of, and level with, the stuffing-box, are to be several small rollers, on which the shafts are to rest, to facilitate the protruding of the shells. The shells and their shafts must be perfectly cylindrical and smooth, to fit the stuffing-box accurately, and thereby prevent the admission of water. The shafts are to be of the best fir, 44 feet in length, 2 feet in exterior diameter, by 12 or 14 inches interior, and their extremities to be strongly hooped with iron. The small end of the shell is to be inserted in the shaft, and securely retained in its place by screws in the wooden cylinder round its base. A shaft, with its attached shell, will be 45 feet in length, of which 30 feet is to project beyond the stem-post, and the remainder to be contained in the tube and within the vessel. A shell with its shaft will not exceed two tons in weight. The interior ends of the shafts to be concave, and their central openings to be shut with blocks of wood, leaving apertures for the wires, which must be made water-tight. When the shells are protruded, the force of direct collision with ships would be so great as to break the shafts; to prevent this, powerful buffers, properly secured to the vessel, must be opposed to their interior ends, allowing them to move back several feet, whereby they will be preserved from being damaged by collisions. When a shell is protruded, its shaft must only extend 2 or 3 yards from the stem, for were it projected the full length it would impair the speed or steering of the vessel, and should only be fully extended when close to the ship against which it is to be directed. When the steamer is close to a hostile ship, the lowest power of the engines should be used, the shaft of the shell extended to the full length, and the buffers placed at its end; after which it is to proceed directly against the side or any other part of the vessel, so as to strike the shell against it, upon which the shaft will press back a short distance and the shell instantaneously explode, forming a breach that will immediately sink it. As the shaft is hollow and contains the conical portion of the shell, the force of the explosion will blow it to pieces, and consequently it cannot transmit any of the effect of the explosion to the steamer, which will be as secure from its force as if there had been no shaft between them. The portion of the shaft contained in the tube and stuffing-box will remain there, until pressed out by the next shell. The extent of water between the steamer and shells is amply sufficient to protect it from all injury by their explosion. The shells could be fired by percussion, but by such a mode they would be liable to be accidentally ignited, and therefore galvanism should be employed. For this purpose each should have two conducting-wires; one terminating above the lower deck and the other below it, in order that the shell may be fired from either with equal facility.

The vessel will conveniently carry from 20 to 30 shells, which should be stowed in the fore part of the hold; and can apply the whole in succession without retiring out of reach of shot, as must be done in submerging trains of galvanic shells. Steamers of the preceding construction can efficiently apply collision shells at all times and in all circumstances, without exposing their crews to such danger as in ordinary warfare; they would sustain the heaviest fire of line-of-battle ships for the short time required, without disabling their machinery; and however much shattered and damaged, they can be more easily repaired than any other kind of vessel. Their being without mast or rigging will greatly facilitate this.

An account of both kinds of shells, and the modes of applying them having been given, it now remains to notice some of the advantages which would result from their adoption.

An iron galvanic shell, including the charge of powder, will cost about £200; a brass collision shell, about £80; and, therefore, 600 galvanic, or 1,500 collision shells can be completed at the same expense as a single first-rate line-of-battle ship. A steamer for applying collision shells would

only cost one-half the expense of a first-rate ship, while it will require less than one-sixth the number of crew. As a single shell is sufficient to destroy any ship, whatever may be its size, number of guns, and amount of crew, their superiority to artillery is evident; and line-of-battle ships can offer no more effective resistance to them than would small sloops; success depending upon speed alone, and not upon the number of men and guns. Hence, their adoption would render artillery comparatively useless in naval engagements; and all slow, heavily-armed vessels would have to be superseded by large lightly-armed steamers of the greatest attainable strength and velocity. By the reduction, which the adoption of galvanic shells would render practicable, in the number of ships, artillery, and men, the expense of naval forces could safely be reduced to less than one half its present amount; which, to Britain alone, would effect a saving of more than £3,000,000 per annum, and at the same time increase the efficiency of its navy.

By employing collision steamers and shells, naval expenditure would be still further reduced; because as they could carry a large number of shells, and rapidly apply them, a few of them would annihilate the most numerous fleets, and defend any country from maritime attacks. Such steamers are adapted for all naval purposes, except bombarding seaport towns; for which a few screw line-of-battle ships would be necessary; but with this single exception, heavily-armed vessels would be utterly useless and unnecessary.

The French line-of-battle steamers are superior in speed to any in the British navy,* and consequently could at present apply galvanic shells more effectively than the war vessels of any other nation.

With regard to the practicability of applying galvanic shells, it should be observed, that their success wholly depends upon the possibility of firing them at the proper time by the means proposed; and on that there cannot be any doubt, because the power that explodes gunpowder at a distance of 30 miles will undoubtedly prove as effective at a distance of 200 or 300 yards. That they can be applied by vessels in the manner described is equally certain, it being, in fact, much more practicable to apply them than it is to board ships. In boarding, the vessels must come into close contact; whereas, in applying the shells, they need not come within 100 or 200 yards distance from each other. As to collision shells, it is certain that they can be applied with more facility and rapidity than the other kind, without danger to the steamers employed, the extent of water between them being more than sufficient to protect the vessels from injury.

Although the reduction of naval expense would prove more beneficial to Britain than to any other country, there are causes which prevent its government from encouraging or adopting any invention by which this object would be accomplished. Of these, the principal is the opinion that a mode of warfare not requiring many ships, men, or artillery, would render a powerful and numerous navy of no avail, and tend to strengthen weak powers by enabling small fleets to resist superior numbers. Another objection is, that it would displace a number of naval officers, for whom no eligible situations could be obtained. With regard to the first, it wholly depends upon the nature of the invention whether it would have such effect or not. If it could be applied without the aid of ships, it would undoubtedly weaken the British navy; but if requiring to be applied by ships, it would, on the contrary, strengthen it. The other objection is one to which all new inventions are liable, and so indefensible as not to require an answer. Until Britain possesses a government really desirous of economising the public revenue, no invention, however practicable, will be introduced into its navy, whatever advantages would result from it.

By the preceding inventions the conditions of success in naval warfare would not depend upon the number of men and artillery, but upon the strength and speed of the vessels; and hence superiority in ship-building and machinery will alone insure success.

P.S. Galvanic shells, of the aggregate weight before mentioned, will (by reducing the weight of the shell, floats, and ballast to 2 tons), contain 2 tons 13 cwts. of powder; and by increasing their total weight to 5 tons, charges of 3 tons may be used, if necessary. The proper charge can only be ascertained by experiment; but as the shells can be brought nearly in contact with ships, it is probable that it will be less than those mentioned. Vessels applying them should not fire any when close to the enemy, lest the smoke of their guns should prevent the floats of the shells from being distinctly observed; but if necessary the top of the floats may be increased to a foot in diameter, so that their situation may always be known. The towing lines should be stronger and more rigid than necessary for towing, in order that they may not be broken by the shells striking against ships, and to protect the wires from being bent too much.

* We believe this opinion, which is very prevalent, to be without foundation.—Ed. M. M.

INSTITUTION OF CIVIL ENGINEERS.

Sitting of Jan. 10th, 1854.

The proceedings of the evening were commenced by an Address from the President, James Simpson, Esq., on taking the chair, for the first time, after his election.

After expressing his sense of the distinction conferred on him, by his election to the post of President, he embraced the opportunity of acknowledging the debt of gratitude he, in common with many other members of the profession, owed to the Institution of Civil Engineers, where they had first found a field for the exhibition of their talents, and had there formed the valuable and lasting friendships, to which might be attributed the good feeling prevalent in the profession.

He then alluded to the difficulties formerly experienced by young engineers, at the commencement of their career, chiefly from want of opportunity of contact with, and experience of, the proceedings of the older practitioners; contrasting it with their present freedom of communication with the seniors, at the meetings of the Institution, where all met on a footing of equality and with a predisposition to afford the aid, or advice that might be requested.

He then gave a slight sketch of the professional career of his father, who entered the metropolis as a millwright in 1778, and before his decease, had raised himself to eminence as a civil engineer, and was the coadjutor of Smeaton, Jessop, Watt, Rennie, Telford, and others. Under him Mr. James Simpson commenced his practical career, of which he gave a rapid outline. As a very old member of the Institution, having been elected in 1825, and chosen a member of council in 1826, he ventured to give some sound practical advice on the subject of agitation in societies.

He then gave a succinct account of the great engineering works in progress in India, Egypt, Sweden, Norway, Denmark, Canada, Australia, Cuba,—on the European continent generally, and in Russia; chiefly under the direction of members of the Institution.

The maritime works on the Thames, the Tyne, the Severn, the Clyde, the Avon, &c.—the harbours and docks at Harwich, at Dover, at Guernsey, Jersey, Alderney, Portland, Holyhead, Plymouth, Leith, Hartlepool, and other places; the works at the Norfolk Estuary, the reconstruction of the Bishop's Rock Light-house, and other important labours of civil engineers, were also noticed.

He also alluded to the subject of screw propulsion, and the valuable, and hitherto unrewarded labours of Mr. F. P. Smith, as triumphantly demonstrated in the late Naval Review at Spithead, and the general adoption of the system for an improved class of steam and sailing vessels.

The new system of propulsion invented by Ruthven, and introduced by Mr. Clark, for the Deep Sea Fishing Company, was also mentioned.

The improvements in the supplies of gas and water, particularly of the latter, were noticed, in contradiction to assertions made "by authority" that little, or no amelioration had taken place.

A short history of the waterworks of the metropolis was given, to show that the extensions and ameliorations of filtering and high service had closely followed the facility for obtaining cast-iron pipes, in large quantities, and at a reasonable rate; and that the improvement in steam engines and pumping machinery had also produced corresponding advantages.

Attention was directed to the present state of the sewerage of cities and towns, and also that of the drainage of farm lands; for the former it was urged, that more had been done than was generally admitted; and for the latter, the partial steps hitherto taken were contended to be inefficient, unless the system was introduced on a larger scale, and extended to arterial and trunk drainage, and the improvement of the principal drains and water-courses in the low lands.

The regulations for the prevention of the nuisance of smoke, from steam and other boilers, were noticed, and the various trials already made were examined.

The present general employment of members of the profession was alluded to with pleasure, as demonstrating that the science and practice of engineering had not experienced any check; and with a tender, to the junior members of the Society, of any advice or assistance in his power, the President concluded his address, which was unanimously voted to be printed and published with the minutes of proceedings.

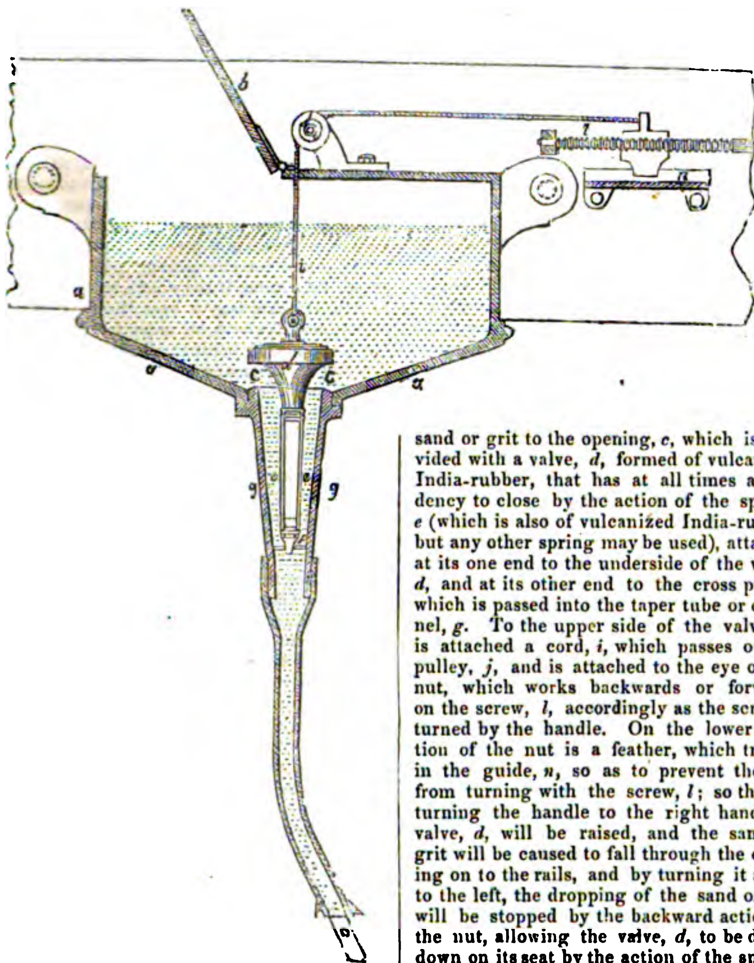
The discussion was resumed on Mr. Harrison's Paper, "On the Drainage of the District South of the Thames;" and was adjourned until Tuesday, January 17th, when it was announced that the whole evening would be devoted to the subject.

BEALL'S RAILWAY SANDING APPARATUS.

This improved apparatus consists of a means whereby sifted sand, grit, or other suitable material or substance is dropped on to lines of railway, immediately in front of the driving wheels of a locomotive engine, in suitable quantities, as the slippery state

of the rails or the rate of inclination of the line may require; and where the line is in such a state as not to require such means of giving additional bite to the driving wheels of a locomotive, the dropping of the sifted sand, grit, &c., is prevented by the closing of a valve.

In the accompanying engraving, *a* is the reservoir for the sand or grit, having a lid, *b*. The bottom of the reservoir, *a*, is inclined in such manner as to conduct the sand or grit to the opening, *c*, which is provided with a valve, *d*, formed of vulcanized India-rubber, that has at all times a tendency to close by the action of the spring, *e* (which is also of vulcanized India-rubber, but any other spring may be used), attached at its one end to the underside of the valve, *d*, and at its other end to the cross pin, *f*, which is passed into the taper tube or channel, *g*. To the upper side of the valve, *d*, is attached a cord, *i*, which passes over a pulley, *j*, and is attached to the eye of the nut, which works backwards or forwards on the screw, *l*, accordingly as the screw is turned by the handle. On the lower portion of the nut is a feather, which travels in the guide, *n*, so as to prevent the nut from turning with the screw, *l*; so that by turning the handle to the right hand, the valve, *d*, will be raised, and the sand or grit will be caused to fall through the opening on to the rails, and by turning it again to the left, the dropping of the sand or grit will be stopped by the backward action of the nut, allowing the valve, *d*, to be drawn down on its seat by the action of the spring, *e*; *o*, shows a piece of India-rubber tube intended to go close to the rail, to prevent the wind drifting the sand, and also to prevent the pipe being damaged by meeting any obstruction.



CONSUMPTION OF SMOKE.

It is not to be expected that the operation of Lord Palmerston's Act will do more than materially abate the inconvenience and loss suffered by the inhabitants of London,

in consequence of the smoking chimneys with which it is crowded. It is apparent that the evil will continue to exist to a very large extent, until the dwelling houses, as well as the factories, cease to produce and emit smoke. For this reason the following statements, taken from our excellent contemporary, the *Journal of the Society of Arts*, are of a very interesting character:

"In the *Journal of Gas Lighting* for the past month, Mr. Julius Jeffreys communicates to its readers a plan for clearing the atmosphere of towns from the smoke of household fires. He proposes to make the bars of the fire-grate hollow, and to connect these hollow bars with a gas-pipe. The grate is filled with gas coke, and the grate-bars are perforated with small holes on that side nearest to the coke they contain. The gas being turned on by means of a stop-cock in the usual way, and lighted by a match, quickly ignites the coke in the fire-place, which soon becomes glowing hot, and is kept so by the small jets of flame below and in front; and a bright and cheerful fire is kept up, burning with more or less intensity as the supply of gas is increased or diminished, and it burns without smoke. This is certainly an elegant and expeditious mode of kindling a fire, and Mr. Jeffreys shows it to be by no means a costly one. It is evidently well suited for drawing-rooms and apartments where the furniture might be injured by smoky fires.

"Mr. Davenport, one of the officers of the Society of Arts, has adopted a method somewhat similar to that proposed by Mr. Jeffreys, for the fires of bed-rooms, which are required to be lighted on short notice, and to burn without smoking. Mr. Davenport connects a hollow ring with the gas-pipes near the chimney, by means of a flexible tube of the ordinary kind. This hollow ring is entered between the two lower bars of the front grate, is perforated on the upper side with small holes, and the fireplace is filled with coke above the ring, which lies upon the bottom grate. The jets of gas issuing from the holes in the hollow ring being lighted ignite the coke above, and soon produce a clear and smokeless fire. The Transactions of the Society of Arts contain many valuable papers on the construction of domestic fire-places, and stoves for warming and ventilating apartments, which may be read and studied with advantage even now, although the use of coke, anthracite, and gas, has, to some extent, modified and superseded many of the ingenious contrivances there described."

ON THE SCREW PROPELLER.

To the Editor of the Mechanics' Magazine.

SIR,—I hardly feel safe in venturing to answer Mr. De Penning's second letter on his theory of resistances. It appears that he uses *some* words without any reference whatever to their established meanings. He may be doing the same with *all* the words in his letter, for anything I can tell. I certainly thought that he was trying to write English. I beg his pardon if I misunderstood his attempt. Perhaps, Sir, you will favour me with a small amount of space in your valuable Magazine to point out, in the letter alluded to above, some propositions, to the words of which it will be necessary for the author to assign new significations, in order to render them compatible with common sense. Of course, if the words were intended by Mr. De Penning to bear their usual significations, it would be almost unnecessary for me to notice them at all; they would be so absurd. Here are two little propositions, Sir, self-evident to those who have read the two letters in question: First, if Mr. De Penning's views are correct, they are expressed in an unknown tongue: Second, if, on the contrary, the words in which they are written are to be taken according to their English import, the said views are simply ridiculous. If the first of these hypotheses is the fact, it remains for Mr. De Penning to publish the key to the cypher he has adopted. (But I fear he has lost this, Sir). If the second is so, his only rational course is, to refrain from writing any more on the subject till he has made himself acquainted with some of the first principles of natural science.

But to the letter: those words, which apparently occupy very anomalous positions in it, are, *demonstration*, *proof*, and *argument*. I certainly never heard of anybody else using them in such connections. I cannot help wondering what they mean. He applies them to the following: since the barometer falls during an increasing gale of wind,* therefore the principal cause of resistance to the motion of a body through a fluid is the diminution of the pressure on that side from which the body moves. I disproved what I thought was stated in the first letter; namely, that this was the only source of resistance; and now it seems that the strange-looking quotation, which we have both made, beginning, "this force, reaction, is nothing more, &c.," means that the diminution of the pressure on the negative side is the "*principal* cause of resistance."

* Does Mr. De Penning know that the barometer sometimes rises in an "increasing gale of wind?"

I wonder, Sir, what "principal cause" means in his vocabulary? I should hardly be surprised if this were "explained" to denote *partly the cause*, or something of that kind. Then, again, the representation of the blades of screws as planes may be made all right by *explaining* the word *plane* to be the name of what is ordinarily denoted by the phrase *hyperbolic paraboloid*, or something else equally unlooked for.

Here is something with which I am much pleased, and perfectly agree. Alluding to the theory he advocates he says, "Now the matter is reduced to this,—it *is* the case, or it *is not*." That is very true, Sir, but I can go no further with the writer; for immediately he answers the question, Would a body moving through water which is unaffected by gravity, meet with any resistance? by saying, "Most assuredly not!" Why, Sir, in common English the truth would be, that a resistance would be experienced of a magnitude varying directly as the square of the velocity. I will not attempt to say whether this is what is intended.

Before concluding I will, as clearly as I can, state what I hold to be, so far as they go, indisputably the correct views on resistance. I. The resistance offered to the motion of a body through a fluid may be considered to be composed of two parts; one part due to the increase of the pressure on those parts of the body which move towards the particles of fluid in contact with them; the other due to the diminution of the pressure on those parts which move from the contiguous portions of the fluid.

II. The first constituent part of the resistance increases with the velocity in such a way as to become infinite when the velocity is so; and it is independent of all statical pressure.

III. The second constituent part varies from nothing up to the statical pressure, which is the limit reached by it when the body has reached a certain determinate velocity; and it is constant for all higher velocities.

If Mr. De Penning can give us any method of calculating these from knowing the velocity, he will confer a benefit on the scientific world. I am, Sir, yours, &c.,

J. C.

Deptford, Jan. 14, 1854.

THE FISH GUANO QUESTION.

To the Editor of the Mechanics' Magazine.

Sir,—Having observed some time back in the English newspapers that the attention of the Royal Agricultural Society of London had been directed to the preparation of fish guano, allow me to furnish you with some particulars on this question, which I have studied for several years.

One of my brothers and myself have been some time engaged in agricultural pursuits, and having been continually checked by the difficulty of procuring manure, we conceived the idea, in 1849, of making manure from fish. We reduced a small quantity into powder, and having had this powder analysed by Monsieur Malagutti, a celebrated chemist, it was found to be of a richer quality than Peruvian guano.

Having thus ascertained its fertilising properties, we next endeavoured to produce it in considerable quantities.

In May, 1851, I set out on an exploring expedition to the North American Islands (Newfoundland, St. Pierre, and Miguelon), with the sole object of studying the resources which these regions, so much frequented by fishermen, might offer us. The information I obtained surpassed our expectation. The remains of cod-fish alone thrown into the sea every year form considerable masses, which might be preserved and stored up without difficulty and at very trifling expense.

After obtaining these satisfactory data, we immediately had machines constructed which we deemed suitable for the preparation of the substance, and in July, 1852, I started a manufactory in the harbour of Querpont, in the northern part of Newfoundland.

The preliminary works were only finished at the end of September, and although the season was then far advanced, I succeeded in manufacturing a certain quantity of guano, which I took with me to France.

The means at our disposal for the manufacture being, however, still very imperfect, and finding that the production of this guano presented many more difficulties than we had at first supposed, we formed a manufactory at Concarneau (on the coast of Britany), for the purpose of making ourselves masters of the details necessary for complete success, with the intention of eventually removing the plant to Newfoundland, not supposing that a sufficient quantity of fish could be found in Britany at prices sufficiently low to answer our purpose.

Experience has just proved the contrary; the fishermen being sure of immediately selling their fish, in whatever condition they obtained it, and to whatever species it might belong, supplied us with it in abundance, so that instead of removing our works, we are now increasing the establishment considerably.

The results we have arrived at are as satisfactory as possible, and our means of desiccation and pulverisation are such that,

in a few minutes after the fish has been brought to us, we are enabled to supply it in the shape of guano to agriculturists, by whom it is greatly prized.

While working in Britany, we were placing our establishment in Newfoundland on a footing calculated to increase its efficiency, and we made such alterations as experience had indicated.

Being desirous to extend as much as possible this guano manufacture (which promises to render such important services to agriculture), we are now engaged in establishing a manufactory on the coast of Devon, where a good supply of fish can constantly to be obtained. We have already ordered a portion of the apparatus necessary for the purpose, and hope shortly to be in a position to manufacture in England.

This is the point to which we have brought this important manufacture after three years' study.

You may probably understand, then, with what astonishment we read in the papers that a Mr. Pettitt, calling himself the *inventor of fish guano*, proposed to manufacture it, and, being desirous to know what were his claims to this invention, we therefore made ourselves acquainted with the specification of the patent granted to him (bearing date October 1, 1852), and the specification distinctly proves that Mr. Pettitt has not occupied himself practically with the question. Moreover, the easier way to settle his claims as inventor would be to compare the date of his patent with ours, which was taken out in England in Mr. Brooman's name, and is dated August 10, 1852. Our French patent bears date, 1851.

Herewith, I forward a small sample of fish guano, made by us in France. And we are in a position to forward forty or fifty casks immediately, to be used by way of experiment.

This, Sir, is a faithful statement of the fish-guano question; which I leave, without further remark, to the consideration of your readers. I am, Sir, yours, &c.,

E. De Molon.

London, Jan. 17, 1854.

SHELLS FOR WARFARE.

To the Editor of the Mechanics' Magazine.

Sir,—When Mr. Nasmyth's plan for destroying the ships of an enemy by means of a submarine shell was published some time ago, it occurred to me that a considerable improvement might be made in its mode of operation. As it is not improbable that some idea of a similar kind may be brought forward when Mr. Dunbar's communication (in your last Number) shall be continued, I take this opportunity of describing at once the modification which suggested itself to my mind.

Instead of projecting a shell, I would reverse the operation, and cause the *mortar itself to be the projectile.* Thus, instead of having to fix to the bows of a vessel a mortar strong enough to resist the explosion which is intended to destroy the enemy's ship, it will suffice to attach a strong post to the prow of the vessel, say one foot thick, and covered with iron. In sections figs. 1 and 2, the post is marked A, and it is

Fig. 1.

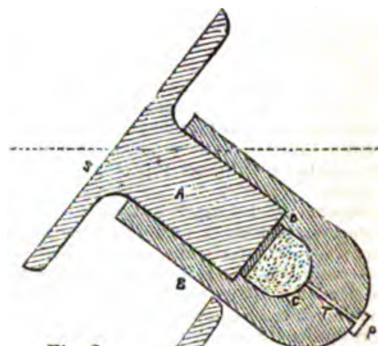
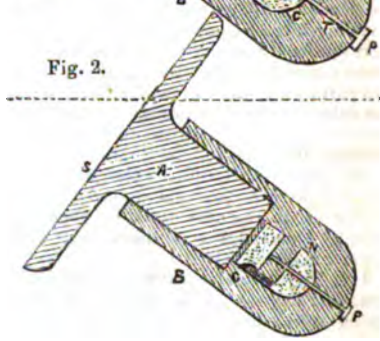


Fig. 2.



inclined downwards if it be desired to project the exploding shell in that direction.

Fig. 1 shows the rest of the engine, if it be desired to project only a heavy mass of iron into the enemy's side; and fig. 2, when this mass is to contain an explosive mixture, so as to fly in pieces after being projected.

In fig. 1, B is a wrought or cast-iron vessel, shaped like a mortar; C, the powder-chamber filled up to D, and with a water-tight wadding at that point. The hole, T, has a percussion-box fixed at P, when the engine is about to be used; and as it is probable that the concussion of a vessel carrying this engine, and running full speed at another's side, would cause the first to recede before the powder could be fired,

the tube, I, may be prolonged, say 2 or 3 feet beyond P, and thus the percussion powder will be fired about a second before the mass, B, touches the enemy's vessel. By this time, the charge in C would be ignited also, and the heavy mortar, B, will be forced forwards. The strong post, A, constitutes the "rear resistance" to the explosion, and the shock received by the vessel carrying this engine of war would be greatly eased by the partly upward direction of the impulse.

In fig. 2 the chamber, C, is divided into one part, C, containing the projective charge (as before), and another, N, filled with the explosive charge, and to be fired by the fusee at C, in a tube piercing the strong division between the two chambers, as in an ordinary bomb-shell. This engine may be used either above or below water, and it is a question whether it may not be at all times better to project the mortar itself (*even on land*),—especially since the shape of B is exactly that of the Minié ball—rather than project the round shell now used, requiring the stationary part of the engine (that is the mortar) to be large enough to contain the shell, seeing that in the former case the corresponding part (the post) need only be large enough to go inside the chamber. Numerous collateral suggestions will occur to any one who reflects on the leading idea of the foregoing modification, that is the substitution of the mortar for the shell, and of a solid post for the mortar. I am, Sir, yours, &c.,

J. M.

Temple, January 10.

THE APPLICATION OF AIR-CHAMBERS TO PUMPS.

To the Editor of the Mechanics' Magazine.

SIR,—I beg to express my best thanks to you for having inserted my former communication, and to Mr. Baddeley for his reply. It appears that the application of air-chambers to pumps is approved of both by scientific and practical men; and they seem peculiarly applicable to pumps which have an inclined suction-pipe, for bringing water from a distance, as in such pipes there must be considerable friction. I do not, however, see the absolute necessity of a third valve, as shown in Mr. Baddeley's figures. For let us suppose a pump thus fitted with an air-chamber, and that by the act of pumping it has been partially filled with water; then, let the piston again ascend, and the water in the pipe is immediately put in motion by the external atmospheric pressure, the second and third valves are opened, and the water rushes into the cylinder of the pump, and, if there is not a sufficient supply from the suction-pipe, the remainder is derived from the air-chamber; the exhaustion in the cylinder being greater than in the air-chamber; the piston descends, and the second valve is shut; but the third valve remains open, and the water from the pipe flows into the air-chamber; this third valve is always open, and so unnecessary. I acknowledge, if the air-chamber is not of sufficient capacity, the air in it will re-act, and shut the valve. But this I look upon as a defect; the great object being to keep up a regular flow of water through the pipe. The relative proportion which these air-chambers should bear to the pipe and the cylinder of the pump, would no doubt be greatly modified by the length and form of the suction-pipe; yet, perhaps, some formula might be given as a general guide, and it would also be useful to know how they may be fitted up in the most economical manner. This is really a subject of much importance, both to engineers and employers. I know a pump with a 6-inch cylinder, and a 3-inch suction-pipe, about 60 feet in length, placed in an inclined direction; and to make the matter worse, the water has to pass round two nearly right angles. The pump has about 20 feet lift, and has been in constant operation for more than twenty years, with very great labour and comparatively small benefit.

I am, Sir, yours, &c.,

HYDRAULICUS.

GEOMETRY AND NAVAL ARCHITECTURE.

To the Editor of the Mechanics' Magazine.

SIR,—I am very glad to see that some of your correspondents are taking up problems in the geometrical department of naval architecture. The method that Mr. Barnaby has proposed in your last Number for determining the timber line from the plank line of a ship, and *vice versâ*, is slightly incorrect, doubtless through an inadvertency. The perpendicular to determine the point *c* should not be to the edge of the scale, but to the line *a b* produced. This method has not escaped the notice of those geometers who have paid attention to this important branch of naval architecture.

In a work which will shortly be published on the Application of the Principles of Naval Architecture to Laying-off, which I have had an opportunity of seeing, this method is laid down, and also applied to determining the cutting-down line.

I take this opportunity of stating my conviction that draughtsmen and others, whose duty it is to assist in the operation of

laying-off ships and making calculations, would find the study of the geometrical principles of this art, not only highly serviceable, but very interesting.

I am, Sir, yours, &c.,
A CONSTANT READER.

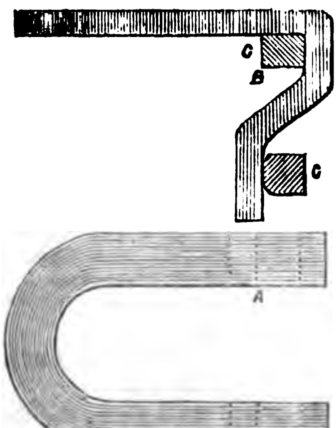
London, Jan. 16, 1854.

HANGING TRIVETS.

To the Editor of the Mechanics' Magazine.

SIR,—The very great usefulness of hanging trivets is known to many housewives, and I believe the danger and inconvenience attendant on the employment of many of the cast-iron ones are becoming equally familiar.

The annexed are sketches of an improved



one, formed of wrought-iron. Each end of A is turned down, and bent into the form shown at B; C C, represent sections of the bars of the grate.

The breadth of the trivet at A should be at least as great as at any other part of it.

Among the advantages of this form are, its simplicity, and the fact that it may be pushed from one end of the grate to the other without danger of pushing it off; and it is scarcely possible to knock it accidentally off the bars, to the great risk of the articles placed upon it.

I am, Sir, yours, &c.,
S. Y. (An Engineer.)

Jan. 13, 1854.

RAILWAY SIGNALS.

To the Editor of the Mechanics' Magazine.

SIR,—As it appears that a convenient and efficient means of communication between the guard of a railway-train and the engine-driver is very much in requisition, I would beg to ask, if a gutta percha tube, lying along the tops of the carriages, in any suitable position, could not be audibly spoken through? The tube might be about 3 inches in diameter, and have funnel ends formed to it. Gutta percha is well known to be an excellent conductor of sound, and would, I think, answer the purpose well. The tube might be extended or contracted according to the length of the train, either by being coiled up, or by being fitted telescopically. It could likewise be connected to some of the carriages, at or near the middle of the train, by short branch pipes, so that upon anything dangerous or alarming occurring there, the messengers might communicate with the guard or driver.

I am, Sir, yours, &c.,
A SUBSCRIBER.

Durham, Jan. 12, 1854.

LONDON MECHANICS' INSTITUTION.

WE regret that this Institution is not in so flourishing a condition as might be expected. Situated in the centre of this great capital, and affording very ample opportunities for personal improvement and social entertainment, it is somewhat surprising that the inhabitants generally, and the youth particularly, of this metropolis, should allow it to suffer from the absence of their sympathy, and to decline for the want of their support. In our great manufacturing provincial cities and towns, similar institutions are, almost without exception, in a healthful and prosperous condition; we sincerely hope that the people of London will speedily deliver themselves from the reproach which now results from the comparison of these with their own institution.

We are pleased to find that the present Committee of Managers are earnestly attempting to improve and extend the Society. With this object, they held a *soirée* and *conversazione* on the evening of January 4th, on which occasion the thirtieth anniversary of the Institution was celebrated. It was gratifying to find it exceedingly well attended, and the proceedings conducted to the great satisfaction of the audience. On this occasion, after a short address from the Chairman, the assembly were entertained with a concert, which repeatedly elicited prolonged applause.

On Wednesday evening last, the erudite and estimable Dr. Bowring, who is about to proceed to China, to assume the governor-

ship of Hong Kong, delivered a lecture to the members of the Institution and the public on "The Influence of Knowledge on Individual, Domestic, and Social Happiness." After a few preliminary observations, in which the mighty changes and rapid progression of Western Europe during the last few centuries were contrasted with the long ages of inaction through which the vast populations of China have passed, the lecturer proceeded to read an address prepared and delivered some years since in this country. Although the lecture was thus deprived of some portion of its interest, yet it was received with all the enthusiasm and delight that the excellence of his productions and the impressive ardour of the speaker are sure, at all times, to excite. It was no small gratification to us to have the opportunity thus afforded of listening to one who has long since introduced to the British nation some of the finest productions of foreign genius, his translations being esteemed as the fruit of the persevering cultivation of a great and richly gifted mind.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Bate, Henry, of New Hampstead-road, Kentish-town, surgeon. *A new fire-escape, which he denominates the "Ignevador."* Patent dated July 7, 1853. (No. 1618.)

This invention consists of a tube composed of some durable and elastic material, or of an inelastic material, such as canvass, rendered capable of contracting and expanding by means of elastic springs applied in rows or otherwise externally. This tube is to be placed on the exterior of a building, so that the inmates may drop down it in the event of fire, and be received on suitable cushions.

Croll, Alexander Angus, of Howrah-house, East India-road, one of the sheriffs of London and Middlesex. *Improvements in apparatus used in the manufacture of gas.* Patent dated July 7, 1853. (No. 1621.)

These improvements relate, firstly, to modes of arranging the retorts and the retort-chambers, so that the heat from the furnace passes directly into a chamber containing clay retorts, and thence through openings in the side walls into a side chamber or side chambers, divided vertically by open shelves, on which other retorts rest. Secondly, to setting the furnace up in the retort-chambers or ovens, so that other retorts may be placed immediately under it, the heat first acting upon ordinary clay retorts in the usual manner, thence descending to heat others on each side and below the level of the furnace, and passing thence to iron or thin clay retorts placed immediately under the furnace. Thirdly, to a mode of setting retorts in chambers or ovens, so that the heat first acts directly upon iron retorts in one chamber or oven, then passes freely and rapidly away by channels to another chamber below, containing other retorts. And fourthly, to the use of balls or other weighted valves to the different passages from the retorts to the main, by which, whilst a fresh charge is being placed in any retort, the passage from such retort to the main may for the time be closed, in substitution for water sealing or the hydraulic main.

Stuart, John Knox, of Glasgow, Lanark, surgeon. *Improvements in hats and other coverings for the head.* Patent dated July 7, 1853. (No. 1623.)

Claims.—1. A system of constructing hats and other head coverings with top-descending fillets or rims, leaving free, or partially open annular spaces for ventilation. 2. A system of constructing head-coverings with separate crown or top pieces. 3. The use of wire-cloth, or other permeable material, between the top of the internal hat cylinder and the crown, as well as for covering the ventilating openings. 4. The use of detached or separate crowns or top pieces made flush with the main cylinder.

Cornides, Louis, of Trafalgar-square, Middlesex. *Improvements in treating certain ores and minerals for the purpose of obtaining products therefrom.* Patent dated July 8, 1853. (No. 1625.)

This invention consists in treating ores and minerals, when combined in an amalgam, by means of certain apparatus constructed and arranged for the separation of such amalgam from the sand and other substances with which it is mixed.

Robertson, William, of Rochdale, Lancaster, machine maker. *Improvements in machinery or apparatus for preparing, spinning, and doubling cotton, wool, and other fibrous substances.* Patent dated July 8, 1853. (No. 1628.)

This invention refers, firstly, to slubbing and roving frames, one improvement in which consists in the application of a presser or pressers placed vertically, and constructed and arranged so as to be capable of driving the bobbins by surface motion. The pressers employed are rollers mounted upon axes, which are carried by the flyer in such manner as to cause the bobbins to revolve. Another improvement in these frames consists in causing the spindle to vibrate, so as to provide for the winding of different quantities of material on to a conical surface, whereby the bobbins may be driven at a uniform velocity, thus

dispensing with the differential motion now employed. The second part of the invention refers to the mule, and consists in mounting the spindle-frame upon pivots, so as to provide for a vibrating motion.

Brunier, Louis, of Norfolk-street, Strand, Middlesex, engineer. *Improvements in obtaining power by compressed air.* Patent dated July 8, 1853. (No. 1630.)

This invention consists of a combination of apparatus wherein compressed air is employed in such manner that the air, in passing from one part of the apparatus to another, causes air from the exterior to be drawn in through peculiarly formed openings; and thus the pressure on the interior of the apparatus is kept up, although the air is passed from the apparatus to work the engine.

Saxby, Stephen Martin, of Brussels. *Improvements in apparatus for lowering ships' boats, and for holding and letting go tackle.* Patent dated July 8, 1853. (No. 1631.)

This invention consists,—1. In a combination of apparatus to be used in connection with the ordinary tackle falls, by means of which the boat cannot tilt. 2. In arranging or combining the fastenings of the holding tackle, so that the boat is released upon its reaching the water, and the risk of the boat being dragged along by the tackle, otherwise than head foremost, is prevented; and—3. In the construction and application of a cleat or lever-nip to the releasing of a boat, and for holding and letting go other tackle, such as standing and running rigging, cables, warps, hawsers, &c.

Poole, Moses, of the Avenue-road, Regent's-park, Middlesex. *Improvements in the manufacture of printing rollers.* Patent dated July 8, 1853. (No. 1632.)

Claim.—The manufacture of printing rollers by casting them of an alloy, of which zinc is the basis, and the casting of such rollers in metallic moulds.

St. Charles, Philippe Poirier de, of Fulham, Middlesex, engineer. *Improvements in apparatus for measuring and indicating the distance travelled by cabs and other vehicles.* Patent dated July 8, 1853. (No. 1633.)

This counting and registering apparatus consists of an index and train of wheels, which are placed within or outside the body of the cab or other vehicle, the motion being communicated from the running wheel of the vehicle to the index train by means of an endless band or bands passing round grooved pulleys, one on the nave, or other convenient part of the wheel, and the other on the index which is to receive the motion. Instead of communicating the motion direct, the inventor finds it better to use an intermediate shaft with two endless bands for the purpose; but when one band only is used, it is desirable to employ a tightening pulley to bear upon it, or to use an elastic band.

Parkes, James, and Samuel Hickling Parkes,* of Birmingham, manufacturers and copartners. *Improvements in the manufacture of certain drawing or mathematical instruments, also in packing or fitting the same in their cases, which said improvements in packing or fitting are also applicable to the packing or fitting of other articles.* Patent dated July 9, 1853. (No. 1634.)

This invention consists—Firstly. In using tubes (whether cylindrical or prismatic), of rolled or sheet metal (cut into the required shape), and stamped metal, to form the various parts of dividing or drawing-compasses and other instruments, instead of making the parts of cast metal, as is usually practised. Secondly. In packing or fitting the same or other articles in their cases by means of blocks of peculiar forms.

Restell, Thomas, of the Strand, Westminster, chronometer-maker. *Improvements in walking-stick umbrellas, applicable also to parasols.* Patent dated July 9, 1853. (No. 1635.)

Mr. Restell constructs his umbrellas in the ordinary way, with the exception that, in some cases, he forms both ends of the stick portion of it alike, and cuts the thread of a screw upon their extremities. When used as a stick, the umbrella is closed, and covered with an outer case made of metal tube, vulcanized India-rubber, or other suitable material. The end of this case is closed with a knob or a handle of any required form, and is free to turn, so that the inner part of it, having a thread corresponding to one of those before mentioned cut upon it, the two may be brought together and screwed tight.

Riepe, Ewald, of Finsbury-square, Middlesex, chemist. *Improvements in the manufacture of turret or clock-tower, and such like bells.* (A communication.) Patent dated July 9, 1853. (No. 1636.)

The patentee claims the manufacture of bells of cast steel; preferring to employ a highly carbonized cast steel for the purpose, as it will produce a fuller and more melodious sound than any other description.

Riepe, Ewald, of Finsbury-square, Middlesex, chemist. *Improvements in moulds for steel castings.* (A communication.) Patent dated July 9, 1853. (No. 1637.)

Claim.—Forming those parts of moulds for steel castings, with which the metal is to come in contact, of a composition which will become spongeous or porous when dry, and which will, at the same time, be sufficiently cohesive and plastic to enable it to be moulded into any required form, and,

when moulded, to resist the pressure of the steel while being poured in, and sufficiently fire-proof to resist the heat of the metal.

PEPPIN, HENRY HOSKYN, of New Bond-street, Middlesex, umbrella and parasol manufacturer. *An improved joint for umbrella and parasol-sticks.* (A communication.) Patent dated July 9, 1853. (No. 1638.)

In this invention the adjoining ends of the stick are fitted the one with a conical plug and the other with a tube to receive it. To the plug a short chain or jointed connection is fixed, and this chain, when drawn outwards, has communicated to it a tendency to run back into the tube, by means of a coiled spring, and thus draws the cone-socket into its seat, and unites the two parts of the stick.

TOURNIERE, PIERRE AUGUSTE, of Laurie-terrace, St. George's-road, Surrey, gentleman, and LOUIS NICOLAS DE MECKENHEIM, of Birmingham, Warwick, gentleman. *Improvements in the manufacture of soap and washing-paste, and of the materials used therein.* Patent dated July 9, 1853. (No. 1641.)

In this invention essential oils, obtained by distillation from schist or coal, wood, and turf, are employed as adulterants, by mixing them with the saponified matter; and pure pine-resin, that is, the juice of the pine from which turpentine is extracted, is employed in its native state, to form a saponified solution, by dissolving it in a concentrated lye, at a low temperature, to prevent the evaporation of the essential oil. This solution is added to and mixed with soap and essential oils before the adulterations just mentioned are effected. Also, rice or potatoe starch may be used; being first converted into gelatine by mixing it with boiling lye. This is afterwards added to the soap as an adulterant.

AGER, GEORGE, of Witham, Essex, gentleman. *An apparatus for holding and turning over the leaves of music or music-books.* Patent dated July 11, 1853. (No. 1645.)

In this apparatus levers are arranged on the right-hand side of the instrument, so as to be retained by spring catches or stops; and cords, attached at one of their ends to the outer ends of the levers, are to be passed between successive leaves of the music or book, and then hooked, or otherwise fastened, to a support or standard; or the leaves may be attached to the levers by means of spring clips. The instrument, &c., being thus arranged, upon pulling certain triggers in succession, so as to remove the stops, the levers will be successively moved from right to left, taking with them the leaves of the book or music by means of the cords or spring clips.

FAIRBAIRN, PETER, of Leeds, York, machinist. *Improved machinery for heckling flax, hemp, china-grass, and other fibrous materials.* Patent dated July 11, 1853. (No. 1646.)

The *first* part of this invention relates exclusively to that species of flax machinery wherein two sets of heckles, which act simultaneously upon opposite sides of the strick of flax, are carried by crank or rocking arms, for the purpose of enabling the heckle bars of one set to intersect the curve described by the rotation of the opposite set. The object of the improvement under this head is to multiply the number of heckle bars in such machinery, and thereby to increase the working capacity of it, both as regards the length of strick that may be operated upon, and the amount of fibre that may be heckled in a given time, and that without enlarging the diameter of the heckle drums. And the *second* part of the invention relates to means by which the switching is effected simultaneously with the heckling.

WREDE, FABIAN, of Stockholm, Sweden. *Improvements in gas and air engines.* Patent dated July 11, 1853. (No. 1648.)

In this invention a mass of gas is moved backwards and forwards between two different chambers in such manner, that it does not undergo any change in its volume. During the transport from the one room to the other it is alternately heated and cooled, by which means its elasticity is alternately increased and diminished. This gas is in constant communication with the one end of a common working cylinder, on whose piston it will consequently exercise an alternately stronger and weaker pressure, and cause it to move backwards and forwards in the same way as steam-engine pistons move.

HOPWOOD, HENRY BROUGHAM, of St. George's-street East, Wellclose-square, Middlesex. *Improvements in ships' ports or scuttles.* Patent dated July 11, 1853. (No. 1649.)

In this invention the port or scuttle is supported on axes and collars, which are carried by, and move on horizontal screws that project out from each side of the framing of the port-hole. The collars carry pinions, having female screws formed through their axes, and through these the horizontal screws pass; the pinions and collars which support the port or scuttle being caused to move to and from the port-hole by means of a toothed-wheel turning freely on the outer circumference of the port or scuttle.

DALTON, GEORGE, of Lymington, Southampton, gentleman. *Improvements in reverberatory and other furnaces.* Patent dated July 11, 1853. (No. 1650.)

Claim.—" A mode of constructing reverberatory and other furnaces whereby air, under atmospheric pressure only, is caused, by means of suitable flues or passages, to traverse more or less of the heated surfaces of the furnace, and to pass through suitable openings into a closed ash-pit."

BAUWENS, FELIX LIEVEN, of Pimlico, Middlesex, manufacturer. *Improvements in the manufacture of candles.* Patent dated July 11, 1853. (No. 1651.)

Claims.—1. The preparing of fatty matters for pressing before saponification for the manufacture of candles, by causing the same to be mixed with rape-seed or other oil, and refined by boiling with acid. 2. The employment, for heating fatty matters in the process of lime-saponification, of wrought or cast-iron pans, heated by fire applied directly to them, and the introduction of the lime into the fatty matters in such process in a state of paste instead of diffused in water. 3. A mode of heating and stirring saponified fatty matters in the separating vat by means of steam or other heated fluid circulating through pipes set in motion in the vat by mechanical means. 4. The washing of the sulphate of lime produced in the process of lime saponification, in order to prevent any loss resulting from particles of the lime soap remaining undecomposed, or from particles of the separated acids remaining interspersed among the sulphate of lime. 5. A mode of pressing fatty matters in order to produce stearine by first cold-pressing the margarine or grease separately, then mixing the pressed matters with the separated fatty acids, and then hot-pressing this mixture; or first slightly hot-pressing the mixture, then melting it, and again hot-pressing the melted mixture. 6. The employment of diluted nitric acid for the purpose of hardening and improving the burning quality of fatty matters, either in a neutral or acid state; and also causing a current of air to be introduced into the stuff. 7. The construction of tubs or vats employed in the stearine manufacture, for boiling purposes, with double sides and bottoms, having water introduced between them. 8. The cooling of fatty matters prepared for the manufacture of candles, by forcing cold air into and through the same by means of a force-pump, or other mechanical means. 9. Certain described improvements in apparatus for moulding candles with endless wicks. 10. The construction of machines for glossing and polishing candles with the rubbing surface or surfaces arranged so as to act circumferentially instead of longitudinally only on the candles to be glossed and polished.

FINNEMORE, JOSEPH BACON, of Easy-row, Birmingham, Warwick, manufacturer. *Improvements in sofa springs useful for spring-stuffed upholstery-work generally, and in the adaptation thereof to mattresses.* Patent dated July 12, 1853. (No. 1652.)

Claim.—Forming on, or adding to, sofa-springs, loops, eyes, or openings for lacing through; and the adaptation of the same to mattresses.

LEVESLEY, WILLIAM, of Sheffield, York. *An improved method of making table-knife blades.* Patent dated July 12, 1853. (No. 1653.)

Claim.—The stamping out of the blades from sheets of metal rolled to the sectional figure required for the knife blank.

BURNS, ANDREW, of Glasgow, Lanark, iron ship-builder. *Improvements in constructing iron ships, boats, boilers, and other metallic structures.* Patent dated July 12, 1853. (No. 1656.)

This invention relates to a system intended to enconomise labour and time in the construction of iron ships, &c., by the use of an arrangement for setting out and marking the correct situations of the rivet or bolt-holes in the plates and frames, and the exact shape of the plates used in works of this nature.

*** No. 1640 is still under objection. No. 1647 has not yet been allowed.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

CHEETHAM, jun., JAMES, of Manchester, cotton-spinner. *Improvements in machinery for cutting fustians, velvets, and other similar fabrics.* (A communication.) Patent dated July 7, 1853. (No. 1619.)

The principal improvement upon which the present invention is based is the employment of circular discs or knives as the instruments for cutting such fabrics, in place of the ordinary straight knives.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, Holborn, London. *Improvements in logs for indicating the speed of ships and other vessels.* (A communication.) Patent dated July 7, 1853. (No. 1620.)

The first improvement consists in a certain combination of mechanism for transmitting the effect of the spring to the vane, in vane indicators, and connecting the vane with the indicator; and the second improvement consists in a certain method of compensating for favourable and adverse currents, and for variations in the vessel's draught, by adjusting the action of the spring upon the vane in such a manner as

to make the indication show the true speed of the vessel.

VAUX, CHRISTOPHER, of Brixton, Surrey. *Improvements in floating breakwaters.* Patent dated July 7, 1853. (No. 1622.)

The inventor employs yielding bodies, such as frames of timber, and hollow cylinders or caissons of metal or wood, entirely floating and moved by blocks of cast iron, or other suitable material, fitted to the shank of the anchor, and bolted and strapped so as to add weight to the anchor and keep the fluke firmly in the ground.

DANGERFIELD, BENJAMIN, of West Bromwich, Stafford, engineer, and BENJAMIN DANGERFIELD, jun., of the same place, engineer. *Improvements in constructing and fixing the rails of railways.* Patent dated July 8, 1853. (No. 1624.)

This invention consists in forming a rail, the upper part of which is of the ordinary form, the lower part being formed of a longitudinal rib, which enters and fills up the space between other similar ribs, the whole being connected together by means of pins.

MARSDEN, jun., WILLIAM, of Longridge, Lancaster, manufacturer, and SAMUEL ROSCOW, of the same place, mechanic. *Certain improvements in looms for weaving.* Patent dated July 8, 1853. (No. 1626.)

Claim.—A peculiar arrangement of parts applicable to the weaving of either light or heavy goods, but particularly the employment of a secondary stop-rod, in addition to, or in combination with, the ordinary stop-rod and frog, or any mere variation of the same.

MADDICK, WILLIAM, of Manchester, Lancaster, manufacturing chemist. *An improved mode of treating madder and munjeet, by which the quality of the colouring-matter contained in those substances is greatly improved, and its application to dyeing and printing much facilitated.* Patent dated July 8, 1853. (No. 1627.)

The first part of this improved mode of treatment is a method of artificially accelerating the process of "ageing," so as to arrive in a *few days* at the extreme point of excellence which by the ordinary process it requires years to acquire. The inventor spreads the madder (when ground) on a clean floor and moistens it with water, keeping it turned over regularly every day. In a few days the peculiar smell which characterises madder will have disappeared, and the "ageing" will have been effected. He then proceeds to extract from the madder thus prepared the whole of the colouring matter contained in it, employing for this purpose vessels of wood or any other material, in which are false bottoms perforated with holes and covered with cloth.

BRETT, JACOB, of Hanover-square, Middlesex. *Improvements in photography.* Patent dated July 8, 1853. (No. 1629.)

This invention consists in combining together in one apparatus two photographic cameras in such a manner that two stereoscopic pictures may be taken at the same time and on the same plan.

BOULE, JEAN THEODORE, of Paris, and FRANÇOIS COILLAUD, also of Paris. *Improvements in composing and distributing type.* Patent dated July 9, 1853. (No. 1639.)

This invention consists in combining apparatus in which a series of finger-keys (one for each of the letters and characters in the case) is used in such a manner as to act on a series of forceps, to cause the letter or character corresponding to the finger-key acted upon to be withdrawn from the case, and allowed to fall down a grooved channel or hopper to the galley, which is caused to move each time that a letter is deposited through a distance equal to the thickness of the letter or character.

SPROT, junior, MARK, of Garnkirk, Lanark, gentleman, and ROBERT DENHOLM, of the same place, engineer. *Improvements in the manufacture of pipes or hollow articles from plastic materials.* Patent dated July 9, 1853. (No. 1642.)

This invention relates to the manufacture of pipes and tubular articles, wherein the sockets or end junction pieces of such articles are formed at the time of moulding or shaping the plain portion. In one modification of the apparatus used for this purpose the clay is fed into a pug-mill in the usual way, the spindle of such mill having knives and screw surfaces or inclined blades interspersed throughout its length. The end bearing, or transverse bridge carrying the bearing for the spindle, is set considerably back from the die end of the pug-mill, so as to allow of a knife action in between the bridge and the die. In this way the clay is well worked and mingled together after passing the bridge, and it enters the die in a fully mixed state.

RENSHAW, GEORGE PEARSON, of Nottingham, civil engineer. *Improvements in cutting and shaping.* Patent dated July 9, 1853. (No. 1643.)

This invention relates to the application of a duplex action to the cutting tools of planing-machines, whereby such machines may be adjusted to plane or cut accurately in both directions by a slight setting action at each reversing movement. For this purpose, a single cutting-tool is contrived, with two points, each cutting alternately in its forward action; the tool, being, in fact, a species of inverted T-piece, each cross end being shaped to a cutting edge.

SKINNER, junior, WILLIAM, of Glasgow, Lanark, merchant. *Improvements in win-*

dows, shutters, and apparatus connected therewith. Patent dated July 9, 1853. (No. 1644.)

In this invention, each side of the window-frame, in the interior of the house, is formed with a ratchet-toothed rack, and a corresponding spring-detent is fitted to each side of the traversing-sash. The sash is held in position by the engagement of the detents in the ratchet-teeth until they are disengaged by hand from the interior.

COWAN, PATRICK, of Skinner-street, Middlesex, lamp manufacturer. *Improvements in gas-fittings.* Patent dated July 12, 1853. (No. 1654.)

The object of this invention is to check the evaporation that takes place from the hydraulic slide, and this is done by converting the open cup at the top into a fountain to supply the tubes, that is, by covering in the top and screwing into it a funnel or dip-tube, in which the suspending-rod shall work.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the preparation of glycerine, and in its applications.* (A communication from Victor Courbarlay, of Paris, chemical engineer.) Patent dated July 12, 1853. (No. 1655.)

This invention consists chiefly in the admixture of glycerine, either in combination or solution, with fatty matters, alcohol, acetic acid, water, &c., with all of which it combines readily.

SPECIFICATION OF PATENT FOR WHICH PROLONGATION IS SOUGHT.

CROLL, ALEXANDER ANGUS, superintendent of the Gaslight and Coke Company's Works, Brick-lane, Middlesex. *Certain improvements in the manufacture of gas for the purpose of illumination, and for the preparation or manufacture of materials to be used in the purification of gas for the purpose of illumination.* Patent dated July 29, 1840.

Claims.—1. The purification of coal gas from ammonia by means of the chloride and sulphate of manganese and muriate of iron and sulphuric and muriatic acid, and the purification of coal-gas from sulphuretted hydrogen by the oxide of manganese. 2. The employment of oxide of iron and oxide of zinc in a certain manner, and at a particular stage of the manufacture of the gas; and also the manufacturing or reproducing all the salts by double decomposition.

PROVISIONAL PROTECTIONS.

Dated November 21, 1853.

2701. Aaron Parfitt, of Newbury, Berks. Improvements in the construction of certain descriptions of vehicles.

Dated November 28, 1853.

2771. John Carter Ramsden, of Bradford, York, stuff manufacturer. Improvements in apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.

Dated December 9, 1853.

2858. Jean Baptiste Edouard Ruttre, manufacturer, of Paris, France. Improvements in machines for producing shoddy from woven fabrics and for sorting the fibres of fibrous materials.

Dated December 16, 1853.

2934. Andrew Lawson Knox, of Glasgow, manufacturer. Improvements in ornamenting certain descriptions of textile fabrics.

Dated December 17, 1853.

2937. Joseph Sharp Bailey, of Keighley, York. Improvements in machinery for operating upon wool, alpacha, mohair, and other fibrous materials, preparatory and prior to being spun.

2939. George Anderson, of the Gas Works, Rotherithe, Surrey, gas engineer. Improvements in apparatus used when manufacturing gas, which apparatus or part of which is also applicable when transmitting gas from one place to another.

2941. John Davie Morries Stirling, Larches, near Birmingham. Improvements in the manufacture of iron.

2943. Isaac James, of Cheltenham, Gloucester, wheelwright. Improvements in carts for distributing water or liquid manure.

Dated December 19, 1853.

2947. Henry Milward, of Redditch, Worcester, manufacturer. New or improved machinery for manufacturing needles and fish-hooks. A communication.

2949. Auguste Edouard Loradoux Bellford, of Castle-street, London. Improvements in paddle-wheels for propelling vessels. A communication.

2951. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in presses for expressing oil or other fluids from fruits, grains, or other substances. A communication.

2953. David Goldthorp, of Cleckheaton, near Leeds, York. An improved propeller.

Dated December 20, 1853.

2955. James Hunter Campbell, of King's Arms-yard, Coleman-street, London, esquire. An improvement in machinery for cutting corks.

2957. Henriette Elisa Farlon de Gergy Veuve Durut, of Paris, France. Certain improvements in the manufacture of bread.

2959. James Boydell, of Gloucester-crescent, Middlesex. Improvements in the manufacture of wrought iron frames.

2961. John Webster, of Cornwall-road, Stamford-street, Surrey. Improvements in acting on drying oils and preparing varnishes.

2963. James Burrows, of Haigh Foundry, near Wigan, Lancaster, engineer. Certain improvements in the construction of steam boilers or generators, and in the arrangement of furnaces connected therewith.

2965. R. B. Huygens, of Holland. Improvements in machinery for crushing, washing, and amalgamating gold and other ores and substances.

Dated December 21, 1853.

2967. Charles James Farrington, of Hampstead, Middlesex. Improvements in signalling and preventing collisions on railways by electrical communication.

2969. Thomas Vincent Lee, of Lockyer-terrace,

Plymouth, Devon, civil engineer. Improvements in the construction of certain machinery and apparatus for the manufacture of bricks and tiles.

Dated December 22, 1853.

2973. John Youil, of Burton-upon-Trent, Stafford, common brewer. Improvements in the mode or method of obtaining power to raise liquids and of treating the said liquids when raised, and of using them to obtain additional power.

2975. Peter Armand Le Comte de Fontainemoreau, of South-street, Finsbury, London. Certain improvements in constructing and applying connecting rods. A communication.

2977. Charles Lewis, of Hull, York, master mariner. An improved lamp for signalling.

2979. Thomas Berry, of Rochdale, Lancaster, machinist, James Mangnall, of Heywood, said county, manager, and John Chadwick, of Heywood aforesaid, manufacturer. Improvements in winding and twisting wool, cotton, and other fibrous materials.

2981. Joseph Shaw, pianoforte manufacturer, of Hatton-garden, Middlesex. Improvements in pianofortes. A communication.

Dated December 23, 1853.

2983. John Britten, of Birmingham, Warwick, engineer. Improvements in girders, bridges, roofs, and other such like structures.

2985. Francis Bennoch, of Wood-street, Cheapside, London. Improvements in coating silk and other yarn or thread with gold or other metal. A communication.

Dated December 24, 1853.

2987. Richard George Coles, of Cheltenham, Gloucester, lieutenant Regiment of Foot. Improvements in the locks of fire-arms.

2989. George Goutaret, of Paris, France, gentleman. A new system of propulsion.

2991. Harris Hardinge, of New York, United States of America. Manufacturing liquid quartz or silex, to be used in the manufacture of certain compositions for ornamental and useful purposes.

2993. Joseph Lewis, of Salford, Lancaster, machinist. Improvements in apparatus for drilling or boring metals and other substances.

Dated December 27, 1853.

2995. Thomas Williams Makin, of Manchester, Lancaster, silk finisher. Improvements in machinery or apparatus for finishing woven fabrics.

2997. Frederick Crace Calvert, of Manchester, Lancaster, professor of chemistry. Improvements in the treatment of naphthas and other volatile hydrocarbons, and in the application of the same to various useful purposes. A communication.

2999. Samuel Sedgwick and Thomas Dawson, of Piccadilly. Improvements in the moderator lamp, or in lamps of a similar principle.

3001. Thomas Molyneaux, of Manchester, Lancaster, engineer. Certain improvements in winding and doubling silks, a part of which improvements is applicable to the treatment of other fibrous substances.

Dated December 28, 1853.

3003. John Moffat, of Heiton, Roxburgh, Scotland, teacher. Improvements in the means of communication between the guard and the engine driver in a railway train.

3005. William Unett Coates, of Ombersley, Worcester, clerk. A new or improved rotary steam engine.

3007. Richard Green, of the firm of Davis, Greathead and Green, of the Flint Glass Works, Brettell-lane, Stafford. Improvements in insulators for insulating the wires or rods employed for conducting or transmitting electricity.

3009. John Barnes, of Church, Lancaster, manufacturing chemist. A certain improvement or improvements in dyeing and cleansing cotton, silk, wool, and other fabrics.

3013. Thomas Phillips, junior, of Sparkbrook, Warwick, gentleman, and Samuel Phillips, of Birmingham, same county, gun manufacturer. Improvements in the construction of window shutters, which improvements are also applicable as an additional security for doors and other similar openings.

Dated December 29, 1853.

3015. Edward Estivant, of Givet, France. Improvements in the manufacture of tubes of copper and its alloys.

3017. Amédée François Rémond, of Birmingham, Warwick, gentleman. New or improved metallic tubes.

3021. Hippolyte Charles Vion, of Paris, France. Improvements in pistons and stuffing-boxes of engines moved by water, steam, or gas.

Dated December 30, 1853.

3026. Henri Catherine Camille de Ruolz and Anselme de Fontenay, both of Paris, France, civil engineers. An improved metallic alloy.

3028. Walter Mabon, of Ardwick Iron Works, Manchester, Lancaster, engineer. Improvements in machines used for riveting together metallic plates.

Dated December 31, 1853.

3030. John Milner, of Stratford, Essex, engineer. Improvements in connecting the rails of railways.

3034. Weston Tuxford, of Boston, Lincoln. Improvements in portable thrashing-machines, part of which improvements is also applicable to fixed thrashing-machines.

3036. Richard Waygood, of Newington-causeway, Surrey, ironfounder. Improvements in portable forges.

3038. James Slater, of Salford, Lancaster, mechanic. Certain improvements in cocks, taps, or valves.

3040. Thomas Brown, of Manchester, Lancaster, manufacturer, and Peter Mac Gregor, of same place, manager. Certain improvements in power-looms for weaving.

3042. Benjamin Hunt, of Brighton, Sussex, upholsterer. Improvements in obtaining and applying motive power.

3044. François Aristide Clerville, of Paris, France. An improvement in the construction of fire-arms.

Dated January 2, 1854.

2. Edwin Dalton Smith, of Hertford-street, Mayfair, Middlesex. A mode of communication between the passengers, guards, and engineer of a railway train.

4. James Gowans, of Edinburgh, Scotland, contractor and builder. Improvements in apparatus for heating and ventilating, and in baths and washing-apparatus connected therewith, applicable to dwelling-houses.

6. Peter Armand Lecomte de Fontainemoreau, of South-street, Finsbury, London. Improvements in dyeing wool. A communication.

Dated January 3, 1854.

8. Henry Lee Corlett, of Summer-hill, Dublin, gentleman. Improvements in caoutchouc springs for locomotive engines and tenders, railway carriages, and wagons.

10. David Kennedy, of Reading, Pennsylvania, United States of America, manufacturer of leather. An invention for the use of tanners, being certain compositions of matter to be used in the manufacture of leather.

12. Felix Alexandre Testud de Beauregard, civil engineer, of Paris, France. Improvements in drying cigars and ligneous materials or other substances.

14. John Collins, of Saint Ann-street, Liverpool. Improvements in the manufacture of vinegar.

16. Thomas Mann, of Horsham, Sussex, gentleman. An improved cinder-sifting shovel.

18. John Dransfield, of Oldham, Lancaster, hat-manufacturer, and William Robinson, of same place, cotton-spinner. Certain improvements in carding-engines for carding cotton, wool, and other fibrous substances.

Dated January 4, 1854.

20. John Taylor, of Oldham, Lancaster, cotton-spinner, Miles Wrigley, of same place, carder, and Samuel Greaves, of same place, carder. Certain improvements in carding-engines for carding cotton, wool, and other fibrous substances.

Dated January 5, 1854.

22. Edward Schischkar, of the firm of James Ackroyd and Son, of Halifax, York, manufacturer, and Frederick Crace Calvert, of Manchester, professor of chemistry. Improvements in dyeing and printing textile fabrics and yarns.

24. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in ventilating carriages and buildings, part or parts of such improvements being applicable to the obtainment of motive power. A communication from John Chillcott and George Palmer, both of Brooklyn, New York, United States of America.

26. Léon Joseph Pomme, gentleman, of Paris, France. Certain improvements in reducing the friction of axles and axletrees of carriages.

28. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improved machinery for crushing or grinding and washing and amalgamating quartz, rock, and other substances. A communication.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January 17th*, 1854.)

1860. Jean Pierre Albert Galibert. An improved domestic telegraph.

1878. Samuel Adams. A new or improved apparatus for regulating the supply of water to steam and other boilers, applicable also to regulating the supply of liquids to vessels and reservoirs in general.

1880. James Strong. Improvements in furnaces for smelting iron stones and ores.

1900. John Gwynne. Improvements in the preparation of a black powder from coal, and in the applications thereof to the manufacture of paints, blacking, and various other purposes.

1917. Peter Foxcroft. Certain improvements in machinery or apparatus for "doubling" cotton and other fibrous materials.

1923. Felix Alexandre Victor Delarbre. Certain improvements in treating fibrous substances.

1938. Auguste Mathieu Maurice de Bergevin. Improvements in the manufacture of coke, and in the apparatus connected therewith, and in treating the products obtained therefrom. A com munication.

1944. James Kimberley. An improvement or improvements in raising and lowering various kinds of window-blinds, and in opening and closing window and other curtains; applicable also to the raising and lowering, or winding and unwinding of maps, and other sheets or articles, and to the closing of doors.

1971. George Pollard. Improvements in machinery or apparatus for the manufacture of envelopes.

1978. John Shaw and Joseph Steinthal. An improved manufacture of artificial manure.

2051. Henry Wilkinson. Improvements in the construction of air furnaces, parts of which improvements are applicable to other furnaces.

2066. John Dickinson Brunton. An improved wind-guard or chimney-top.

2152. David Mushet. Improvements in steam engine boiler and other furnaces.

2172. William Lanphier Anderson. Improvements in propelling ships and other vessels.

2174. Thomas Restell. Improvements in opening and closing ventilating louvres.

2230. Henry Jeremiah Iliffe, James Newman, and Henry Jenkins. Improvements in the manufacture of buttons.

2381. Charles Joseph Louis Cloux, junior. A process for the preparation of hemp after the stripping.

2385. Antoine Corvi. Improvements to stationary and portable organs with keys and cylinder.

2420. André Alexandre Beaumont. A system of production of caloric with or without combustible material.

2542. Benjamin Butterworth. Improvements in combining oil with other liquids for the obtainment of a new lubricating compound. Partly a communication.

2633. Samuel Fletcher Cottam. Improvements in machinery for spinning, doubling, and reeling cotton and other fibrous substances.

2684. John Harcourt Brown. Improvements in the manufacture of artificial skins.

2764. Joseph Scipion Rousselot. An improved application of magneto-electricity for driving machinery, and for neutralizing the impulsive force of machinery in motion.

2777. Louis Alexandre Michel. A system of apparatus for sawing and breaking sugar.

2782. John Elce. Certain improvements in machinery for spinning.

2791. Norbert de Landtsheer. Improvements in machinery for combing flax or other fibrous material.

2831. Auguste Edouard Loradoux Bellford. The manufacture of an artificial tartaric acid, and the application of the same to useful purposes. communication.

2840. William Slater and Robert Halliwell. Improvements in machinery for spinning.

2859. Pierre Marie Fouque, Louis Réné Hébert, and Vincent Etienne Doret le Marneur. Improvements in rudders.

2861. Duncan Christie and John Cullen. An atmospheric counterbalance slide valve for the steam engine, hydraulic, and all other machines in which the slide valve is used or required.

2878. Charles Coates. Improvements in and applicable to looms for weaving.

2884. William Thornley. An improved manufacture of woven fabrics.

2887. William Evans. Improvements in obtaining and applying motive power.

2897. John Ambrose Coffey. An improved method of evaporating liquids.

2919. William Binnion. Improvements in carriage and other lamps.

2939. George Anderson. Improvements in apparatus used when manufacturing gas, which apparatus, or part of which, is also applicable when transmitting gas from one place to another.

2949. Auguste Edouard Loradoux Bellford. Improvements in paddle wheels for propelling vessels. A communication.

2961. John Webster. Improvements in acting on drying oils and preparing varnishes.

2963. James Burrows. Certain improvements in the construction of steam boilers or generators, and in the arrangement of furnaces connected therewith.

2985. Francis Bennoch. Improvements in coating silk and other yarn or thread with gold or other metal. A communication.

2992. Gustav Adolph Buchholz. Improved machinery for the cleaning and hulling or dressing of rice, wheat, and other grain.

2999 Samuel Sedgwick and Thomas Dawson. Improvements in the moderator lamp, or in lamps of a similar principle.

3004. James Taylor. Certain improvements in raising and lowering weights.

3008. John Macintosh. An improvement in discharging projectiles.

3012. Duncan M'Nee and Alexander Broadfoot. Improvements in printing with colours on cloth, which are also applicable to printing ornamental designs on paper or other surfaces.

3016. Mary Phillips. Improvement or improvements in metallic revolving or winding shutters. A communication from her late husband.

3017. Amédée François Rémond. New or improved metallic tubes.

3022. Alfred Vincent Newton. Improvements in the manufacture of screws. A communication.

3028. Walter Mabon. Improvements in machines used for riveting together metallic plates.

3032. Chrétien Guillaume Schönherr. Improvements in bobbin-machines.

3036. Richard Waygood. Improvements in portable forges

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

NOTICE OF APPLICATION FOR PROLONGATION OF PATENT.

The application to the Privy Council for Croll's Extension is postponed from the 28th January to the 24th of March. (For the nature of this invention see page 68 present Number.)

WEEKLY LIST OF PATENTS.

Sealed January 13, 1854.

1661. Henry Montague Grover.
1663. Thomas Hill Bakewell.
1667. Arnold Morton.
1672. William Henderson.
1707. William Boggett and William Smith.
1758. Thomas Buxton.
1767. Ange Louis du Temple de Beaujeu.
1982. Eugene de Varroe.
1995. George Robinson.
2111. Louis Achille Brocot.
2355. John Elce.
2400. Charles Peynaud D'Azene.
2432. James Garth Marshall and Peter Fairbairn.
2557. Joseph Henry Tuck.
2590. Edmund Hugh Graham.
2608. William Rodger.
2628. Thomas De la Rue.
2635. Alexander Cuninghame.
2646. John Hall Thwaites and William Bird Herapath.
2654. John Ronald.
2662. John Clare, jun.
2679. William Taylor.
2680. James Melville.
2682. Moses Poole.
2694. John Gerald Potter and Robert Mills.
2711. Alfred Bird.
2714. Frederick Levick and Joseph Fieldhouse.
2830. John Mold.

Sealed January 14, 1854.

1584. Philip Hart.
1675. George Humphery.
1679. Benjamin Looker, jun.
1682. Robert Gordon.
1683. Henri Joseph D'Huart.
1699. Henry Lamplough.
1705. John Wallace Duncan.
1706. Isaie Alexandre.
1710. Samuel Perkes.
1717. Edward Dalton Smith.
1745. William Ireland.
1769. Charles Cummins.
1793. John Shae Perring.
1808. Matthias Edward Boura.
1863. Samuel Hall.
1903. John Henry Johnson.
1914. Edward Finch and Charles Lamport.
2326. William Beardmore and William Rigby.
2335. James Webster.
2591. Humphrey Chamberlain.
2605. Samuel Mead Folsom.
2645. John Cameron and James Napier.
2653. Philip Hill.
2668. Charles Burton.
2685. Henry Richard Cottam.
2717. William Pegg.
2722. John Fielding Empson.
2730. Thomas William Kinder.
2738. Elmer Townsend.
2747. John Henry Johnson.
2819. Charles William Hockaday.

Sealed January 19, 1854.

1712. Peter Armand Le Comte de Fontainemoreau.
1714. Charles Breese.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

A. B., Brixton.—Floss silk is the parts of ravelled silk that are broken off during the filature of the silkworm's cocoon. It is carded like wool or cotton, and is then spun into threads, and from these threads common silks are made.

Jeune Théoricien.—Boscovich's theory is, that matter consists, not of solid elementary particles, but of mathematical centres of force;—that each body is composed of a number of geometrical points which give forth forces, and which are governed by mathematical laws, by which these forces become attractive at small distances, repulsive at greater, and again attractive at still greater. Cohesion, resistance, and the attraction of gravitation, are all said to arise from these forces of the points. Some philosophers think that this theory may possibly be confirmed by explanations of chemical, optical, and other phenomena being found consistent with it.

Inquirer.—Hunter's screw was first described by the inventor, in a paper published in the *Philosophical Transactions*, vol. xvii. The principle of it is the same as that of the differential screw, the invention of which has been claimed by Mr. White, of Manchester, as well as by M. Prony.

M. M.—Certainly.

Z. A. Z.—We cannot say whether the steamers you mention are built under Laird's patent. No abstract of Mr. Laird's specification has appeared in the *Mechanics' Magazine*, but the principal features of the invention were given in a description of the *Queen* and *Prince* (two steam-vessels built by the patentee) in No. 1162, page 204.

A Patentee inquires whether "a Patentee under the new law is not entitled to 25 copies of the specification and drawings of his invention? And if so, how he can obtain them?" By sec. 30 of the Patent Law Amendment Act, 1852, the Commissioners of Patents are empowered to allow the persons depositing or filing a specification to have such number, not exceeding 25, of the printed copies thereof, without any payment for the same, *as they may think fit*. This is a privilege, however, (not a *right*, as our correspondent would appear to believe,) which the Commissioners at present do not think fit to grant; the low price at which the specifications are published placing them sufficiently within reach without resorting to the system of gratuitous circulation. They can be obtained at the Queen's printers, West Harding-street, generally about three weeks after the time of filing.

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Mechanics' Magazine.

No. 1590.] SATURDAY, JANUARY 28, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

HORTON AND KENDRICK'S PATENT VERTICAL BOILERS.

Fig. 1.

Fig. 3.

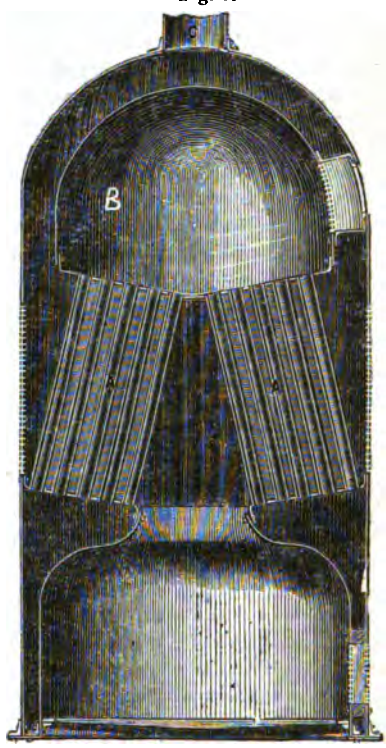


Fig. 2.

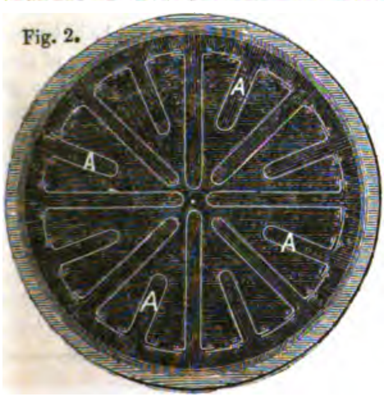
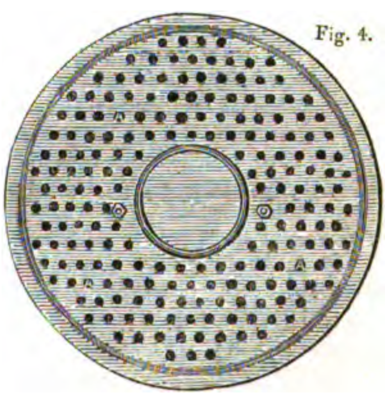


Fig. 4.



HORTON AND KENDRICK'S PATENT VERTICAL BOILERS.

(Patent dated June 3, 1853.)

We have already published a lengthy description of Messrs. Horton and Kendrick's taper water-space steam boilers, accompanied with engravings of a locomotive boiler constructed on their new principle.* We now furnish illustrations of two vertical stationary or marine boilers, one of which is also formed with the taper water-spaces, the other being fitted with a novel arrangement of tubes, the object of which will be explained hereafter.

Fig. 1 is a vertical section of the first of these boilers, and fig. 2 is a horizontal section of the same, taken through the broadest part of the taper water-spaces, A A, which are so constructed that they may be simply and securely connected to the chimney, C. From an inspection of the figures, it will be apparent to every practical reader that this possesses striking and most invaluable advantages over the forms of vertical boilers hitherto invented. And we say this without at all exaggerating the faults of the well-known stationary tubular boilers in which the tubes are vertical, and without neglecting the several inventions having the same objects that have from time to time appeared. In order, however, that the nature of Messrs. Horton and Kendrick's improvements may be estimated according to their real value, we add the following observations upon their practical advantages.

Every engineer is well aware that in boilers with upright tubes, a considerable deposit of silt or scale upon the top of the tube-plate is continually taking place, and that the consequence of this is, that this plate in a very short time burns out, since it is impossible, from the arrangement of the tubes, to get at the surface in order to clear it. Many suggestions intended to remedy this defect have been made, such, for instance, as that of interposing a fire-brick dome between the tube-plate and the fire, and the provision of a collecting-vessel within the boiler; but these are clumsy expedients, and such as it is imprudent to resort to when the evil itself can be avoided. Now from the construction of the taper water-spaces, which diminish in breadth towards their lower parts, and fall off to nothing at their junction with the sides, it is apparent that the only horizontal surface on which the water can leave a deposit, is that which is above the water-spaces, and which can be cleared without difficulty, while every other part of the water-ways is most easily accessible. In fact, nothing can be more simple than the operation of clearing these taper water-spaces, since, by a singularly fortunate circumstance, it happens that in this arrangement of the parts of a boiler, the form that is most favourable to the increase of the heating surface, and the liberation of the particles of steam, is also the best fitted to facilitate the clearing of the water-ways. This is a circumstance that every practical engineer will be able to appreciate.

Of course, to increase the heating surface is the main object of tubular and other such arrangements, and it is attained in the boilers under consideration. It will be observed that the water-spaces are, at their upper part, carried out nearly to the centre of the boiler, thereby presenting an enormous extent of surface to the action of the heat as it ascends, while, by their tapering form, the grate-surface is left undiminished. It is evident that by this arrangement a highly economical evaporative power will be secured. Moreover, it is plain, that in these boilers there will be kept up a continual division and agitation of the heated gases as they ascend, and a very equable distribution of the heat over the whole of the heating surface. Let us again compare these improved boilers with those having vertical tubes. The heat which acts upon the tube-plate of the latter is considerably greater than that which acts upon the tubular surfaces; and, consequently, the former surface is destroyed long before the latter are, and hence, either the expense of restoring the tube-plate must be incurred, or the tubes must be set aside and wasted. The

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* See vol. lix., p. 461.

contrary of all this is the case with the new boilers, in which, as we have said, the heat is distributed over the entire heating surface, which will therefore last until the whole apparatus is fairly worn out.

We need scarcely state, that boilers so constructed will be very strong, the form of the body represented in fig. 2 being that best adapted for strength. Nor need we dwell on their convenience. We have hitherto seen no example of a boiler so small and compact capable of producing an evaporative power proportional to that which this appears to be possessed of.

Fig. 3 represents a vertical section of another vertical boiler, in which inclined water-tubes are employed. Fig. 4 is a horizontal section of the same, taken near the tube-plate. By this arrangement of water-tubes, A A, it is intended that they shall expose a large portion of their surface to the action of the heat, and the products of combustion are caused to traverse round and come in contact with the steam-chamber, B, in their passage to the chimney, C.

BELL'S REAPING-MACHINE.

In the "Journal of Agriculture" for January, 1854, is published an elaborate article on this machine by its inventor, the Rev. Partrick Bell, of Carmylie, Forfarshire. It contains a highly entertaining account of the origin and progress of the machine, and is written in a very temperate and becoming spirit. We have but little complaint to make of the paper, and yet cannot honestly allow it to pass unnoticed; for the mildness of the Rev. gentleman's remarks is sometimes, we apprehend, calculated to conceal their real purpose, and the conclusions to which they are virtually intended to lead. For instance, several pages are taken up by a discussion which obviously is intended to convey the impression that the American reaping machines are all either modifications of, or were suggested by, the author's. In the early part of this discussion the following sentiments are introduced:

"Nevertheless, however, although not the *first*, the Americans may be inventors of the reaping machine, because, at the time of their inventions, they may not have had any knowledge of the principles and details of my reaping-machine. Almost in every department instances are on record of parties independently, and without knowledge of each other's movements, making the same discovery."

This is doubtless perfectly true, and has at least the appearance of liberality and candour. The author, however, continues in the following manner:

"But in every such case the discoveries must have been made, if not contemporaneously, at least of slight intervals of time before the latest inventor can expect the scientific world seriously to investigate its claims. Now it humbly appears to me that the fair and impartial way of approaching and solving such a question as this is to inquire, first, whether the Americans had the opportunity, before giving their inventions to the world, of knowing precisely the principle and plan of my machine,—to prove that the individual American inventors absolutely had this knowledge may be impossible,—and, in the second place, to inquire whether these American machines are so similar in principle and detail as to raise the irresistible conviction in every honest mind that at the time of their construction their builders actually had such a knowledge of my machine that it constituted their model. Now, on this part of the subject, I shall state facts, with as little comment as possible, and leave the reader to judge for himself."

Had the author left us to judge for ourselves, we should have been contented; but a little further on, after his statement of facts is completed, he points out the judgment that he believes we must come to. He says:

"It will be wearisome, and it is unnecessary, to describe the various reaping-machines that have appeared in America subsequently to those now adverted to; but I believe that every honest and impartial inquirer will be satisfied that in America there was no movement whatever in the matter of reaping-machines before August, 1828; that after that period the first attempts *were mere copies of mine;* that by-

and-by one maker after another deviated a little from the original, until latterly there was a considerable change in the aspect of the reaper. If, however, I am not blinded by partiality, in the latest metamorphosis, the theory and design of the original may be traced as the basis or matrix of the implement."

Nothing can be more distinct than this statement of the author's conclusion, and yet nothing can be more ruinous to his own pretensions than the process by which he arrives at it. His argument is this: since descriptions of my machine were published in journals which reached America before the American machines were invented, and these latter machines closely resemble mine, therefore they were copied from mine. The only fair and legitimate conclusion that could be sustained by the premises is, that they may have been so copied; the further probability, that they were, would of course be admissible *as a probability*, though this should hardly be contended for in opposition to the assertions of the American inventors, especially when no legal issues depended upon the matter. That the Rev. gentleman may, however, perceive the exact character of the weapons he wields in the dispute, let us call up, for a moment, that old, but innocent offender, the *argumentum ad hominem*, and direct ourselves to his claims as the inventor of the reaping-machine.

From this article we gather that he considers himself as the inventor of the following three features of his machine:—1. The reel; 2. the scissors or shears; and, 3, the travelling canvass. All of these he claims having invented and combined in 1828. Let us first, then, turn to the invention of the reel, and we find this extraordinary fact—that in the *Mechanics' Magazine* for 1825, there is a full description of a reaping-machine invented by Mr. Henry Ogle, of Rennington, Northumberland, in which the reel was formed and employed in exactly the same way as in Mr. Bell's machine. It is also important to know that the *Mechanics' Magazine* was at that time largely circulated in Scotland, and that the description of Mr. Ogle's machine attracted considerable attention at the time of its publication, as well as subsequently, both in that and in this country. Again; the use of scissors or shears, for reaping purposes, dates as far back, at least, as the year 1807, at which time a reaping-machine was invented by Mr. Salmon, of which they formed the most conspicuous portion. And this invention was described first in the *Farmers' Dictionary*, and subsequently in *Loudon's Encyclopædia of Agriculture.* According to Mr. Bell's process of reasoning, we are led unavoidably to the following conclusion:—"That every honest and impartial inquirer will be satisfied that Bell's reaper, in two out of the three of its principal features, is a mere copies of Salmon's shears and Ogle's reel." This is not our own opinion. We willingly give the reverend gentleman full credit for veracity in his narration of the manner in which he was led, first philanthropically to seek to construct a machine which should diminish the toil of the labourer; and, secondly, ingeniously to arrange and combine the parts of his reaper which has proved so successful. We desire, however, that he should cede to others the indulgence that he evidently so much needs for himself.

In conclusion, we must again refer to the dishonest and flagrant attempt lately made, at the Smithfield Club Cattle Show, to impose upon the public, as "Bell's Original Reaper," a machine which was a complete plagiarism from different and various inventors; to which attempt we made allusion in page 487, vol. lix. On this subject Mr. Bell publishes the following note:—"In the advertising sheet of the *English Agricultural Almanack* for 1854, there is an advertisement thus headed: 'Bell's Original Reaper, manufactured, by appointment, for Mr. Bell, with patented improvements by W. Crosskill, Ironworks, Beverley.' This is very surprising. I am not the Mr. Bell referred to. I never gave any such appointment, and was never asked. What the 'patented improvements' are, I cannot tell, and never saw them." We need not add another word as a further stigma upon this scandalous transaction.

DRAINAGE OF THE DISTRICT SOUTH OF THE THAMES.

The discussion was renewed on Mr. Harrison's paper on the above subject, at the Institution of Civil Engineers, on the evening of Jan. 17.

After reviewing the objections to the proposed main sewer of 8 feet diameter, and its tributaries or feeders, it was explained, that the general dimensions had not been assumed as fixed, but only as data to argue upon; the practical area, as well as the ultimate direction, remaining to be settled by more careful investigation. It might be preferable to construct two parallel sewers, to be used and cleansed by flushing, or otherwise, alternately; or used for fecal matter, or for rain water alternately.

As to cleansing, it was objected that the velocity of 1¼ miles per hour would be insufficient, and a scouring power of 3 miles per hour was demanded by one authority, whilst another stated that a sewer constructed on a dead level, on account of the difficulty of obtaining outfall, was effectually flushed by having gates at intervals of 1,600 feet. At Eton, the main sewer was stated to be horizontal, but having a good supply of water, constantly running through it, no deposit occurred. The quantity of water that could be brought to bear on the Lambeth main sewer being unlimited, and used at each tide, it was argued that the velocity of 1¼ miles per hour would suffice to keep it clear.

The plan of the double reservoirs for the discharge of the sewage into the Thames, would obviate any objections. One reservoir would be filled at low water, to that level, from the river, ready to receive the sewage; the other would be filled with the sewage to a height of 2 feet to 6 feet above that level; into this latter, as the tide rose, the water would be admitted, the gates at the upper end being closed; at the turn of the tide, the lower gates being opened, the contents of the reservoir would be permitted to flow freely out, carrying away the whole of the sewage matter accumulated during the past 12½ hours, and commencing its exit at the turn of the top of the tide, the matter would never return to within half a mile of the spot whence it started. The capacity of the reservoirs being regulated accordingly, there would be no objection to discharging at low water, in cases of heavy rain, as then both reservoirs would be used simultaneously for receiving the well-diluted sewage.

Even admitting certain valid objections to a flushing system, it was agreed to be more simple, and quite as effectual as the pumping system,—whilst it was decidedly more economical and less liable to derangement.

Allusion was made to the present comparative levels of the River Thames and the Lambeth district, and it was suggested whether the bed of the Thames, like that of the Mississippi, the Po, the Arno, and other streams, had not been artificially raised by alluvial deposit; and if so, whether a certain extent of embanking of the shores, so as to restrict the channel, without too much reducing the area for flood waters, would not deepen the centre, and afford a better outfall for the sewers at any given point.

Instances of the employment of the liquid sewage for agricultural purposes were mentioned, and it was urged, that the introduction of water supply for habitations should always be followed by utilizing the sewage from them, and that thus a valuable interchange might be established.

To this it was replied, that the comparative value of the rental of agricultural land and of that of the same area covered with buildings would show, that no parallel existed between the water supply to houses and that of pumping liquid manure for agricultural purposes, and that the schemes for that purpose were, with few exceptions, fallacious.

As to the general question of the drainage of London it was argued, that with a good system of intercepting sewers, the gravitation plan could be adopted for the upper districts on both sides of the river, and on the north side the whole sewage might be so disposed of; but on the south side, on account of the deficiency of fall, it would probably be necessary to resort to a system of pumping the low sewage at some point, say at Deptford Creek, and there lifting it to such a height as to give the requisite fall from thence, by a sewer, into reservoirs, as proposed by Mr. Harrison, whence the matter should be delivered into the river, without any deodorizing, at a point low down, at the first turn of the tide from high water, so as to preclude the possibility of any pollution of the stream above the point of the admission of the sewage. It was contended, that the same skill by which steam power was enabled to be continuously used for long sea voyages, could preclude any but very remote chance of casualty from a derangement of the pumping apparatus, and that in the case of excessive rainfall flooding might be prevented, by permitting the present outfalls into the river to be used.

As to the general question of deodorizing, it was argued, that like the employment of the diluted sewage for agricultural purposes, the schemes might be feasible for small towns, but that the immense quantity

proceeding from such an area of houses as in London, appeared at present to preclude the general adoption of the system.

Up to the present time, it appeared, that all the plans proposed for the drainage of the southern district, were defective in providing capacity of main sewers, for conveying away the excessive rainfall, the amount of which was quoted to the meeting from returns supplied from the Royal Observatory at Greenwich.

It was shown, that at present, when a heavy rainfall occurred simultaneously with a high tide, the districts by the York-road and along the river side down to Bermondsey and lower down, were flooded from the river, which flowed over the surface and down the gullies into the rivers, whence it flooded the houses. Therefore a greater pumping power would be required than had been mentioned, if the habitations were to be guaranteed from casualty, as they should be under a new and expensive system. It was contended, that the outfall should be extended even below Greenwich, as any system of sewerage for the southern districts should be permanent, and allow for any amount of extension of buildings to the eastward.

It was hoped that the facts elicited by the discussion, would be found serviceable, in determining the ultimate system to be adopted, and that special care would be taken to avoid the fallacies, which it was contended had been promulgated in some of the documents emanating, "by authority," from the General Board of Health; particularly in the "Minutes of information collected with reference to works for the removal of soil water, or drainage of dwelling-houses, public edifices, &c."(1852). Numerous errors, both of theory and practise, contained in those documents, were pointed out; and it was contended, that they set at nought all the received laws of hydraulics, the formulæ of De Buat and other experimenters of acknowledged scientific skill, and even the "Principia" of Newton, and only substituted fallacies for those rules which had hitherto formed the basis of the best practice. The tendency of such publications was contended to be very mischievous, and it was incumbent on practical engineers to furnish an antidote, by a careful examination of the published statements and an exposition of the errors; this was undertaken to be done, and was promised to be laid before an early meeting of the Institution.

PROFESSOR FARADAY ON ELECTRICITY.

The Friday evening meetings for the season commenced at the Royal Institution on Friday last, the opening lecture being delivered by Professor Faraday to a very crowded audience. The subject was the development of electrical principles produced by the working of the electric telegraph. To illustrate the subject there was an extensive apparatus of voltaic batteries, consisting of 450 pairs of plates, supplied by the Electric Telegraph Company, and eight miles of wire, covered with gutta percha, four miles of which in coils were immersed in tubs of water, to show the effects of submersion on the conducting properties of the wire in submarine operations. The principal point which Professor Faraday was anxious to illustrate was the confirmation which experiments on the large scale of the electric telegraph have afforded of *the identity of dynamic or voltaic electricity with static or frictional electricity.* In the first place, however, he exemplified the distinction between conductors and non-conductors, impressing strongly on the audience that no known substance is either a perfect conductor of electricity or a perfect non-conductor, the most perfect known insulator transmitting some portion of the electric fluid, whilst metals, the best conductors, offer considerable resistance to its transmission. Thus the copper wires of the submarine electric telegraph, though covered with a thickness of gutta percha double the diameter of the wire, permit an appreciable quantity of the electricity transmitted to escape through the water; but the insulation is, nevertheless, so good that the wire retains a charge for more than half an hour after connection with the voltaic battery has been broken. Professor Faraday stated that he had witnessed this effect at the Gutta Percha Works, where one hundred miles of wire were immersed in the canal. After communication with a voltaic battery of great intensity, the wire became charged with electricity, *in the same manner as a Leyden jar*, and he received a succession of forty small shocks from the wire, after it had been charged and the connection with the battery broken. No such effect takes place when the coils of wire are suspended in the air, because in the latter case there is no external conducting substance. The storing-up of the electricity in the wire when immersed in water is exactly similar to the retention of electricity in a Leyden jar, and the phenomena exhibited correspond exactly with those of static electricity, proving in this manner, as had previously been proved by charging a Leyden jar with a voltaic battery, that dynamic and static electricity are only different conditions of the same force; one being great in quantity but of low intensity,

whilst the latter is small in quantity but of great intensity. Some interesting facts connected with the conduction of electricity have also been disclosed by the working of the submarine telegraph, which Professor Faraday said confirmed the opinion he had expressed twenty years ago, that the conducting power of bodies varies under different circumstances. In the original experiments by Professor Wheatstone to ascertain the rapidity with which electricity is transmitted along copper wire, it was found that an electric spark passed through a space of 280,000 miles in a second. Subsequent experiments with telegraph wires have given different results, not arising from inaccuracy in the experiments, but from different conditions of the conducting wires. It has been determined that the velocity of transmission through iron wire is 16,000 miles a second, whilst it does not exceed 2,700 miles in the same space of time in the telegraph wire between London and Brussels, a great portion of which is submerged in the German Ocean. The retardation of the force in its passage through insulated wire immersed in water is calculated to have an important practical bearing in effecting a telegraphic communication with America; for it was stated that, in a length of 2,000 miles, three or more waves of electric force might be transmitting at the same time, and that if the current be reversed, a signal sent through the wire might be recalled before it arrived at America. Professor Faraday concluded by exhibiting a beautiful experiment illustrative of the identity of voltaic and frictional electricity. The terminal wires of a powerful secondary-coil apparatus were placed seven inches apart within the receiver of an air pump, and when the receiver was exhausted, a stream of purple-coloured light passed between the wires, resembling, though more continuous and brilliant, the imitation of the aurora borealis produced when an electric spark is passed through an exhausted glass tube. The voltaic power employed to produce this effect of static electricity was only three cells of a Grove's battery.

LIPSCOMBE'S IMPROVEMENTS IN SHIP-BUILDING.

To the Editor of the Mechanics' Magazine.

SIR,—Allow me to call the attention of your readers to another grand improvement in ship-building. Mr. Lipscombe, whose hydraulic wonders we have all admired at Temple-bar, has determined to surprise us by his discoveries in hydrodynamics. I have just received a tract, written by him, descriptive of a patent, sealed last month, for his improvements in the forms of ships and boats. I should not have troubled your readers, if Mr. Lipscombe had confined himself to a description of his invention; but reverence for the memory of the dead calls for notice of such a passage as that with which he opens:—"It is a fact, that of all mechanical contrivances, the art of shaping ships is the least understood; some are very slow sailers, some pitch, and others roll tremendously in a moderately rough sea; others are almost sure to founder when caught out at sea by a storm; others again, yachts particularly, when under canvass, heel over so much with a side wind that they look the very picture of discomfort to those on board, and appear in constant danger of upsetting by a sudden squall;—they have a staggering top-heavy appearance that is very unsightly. All these bad qualities can be easily obviated; they are defects owing to an imperfect acquaintance with the laws that relate to the influence the shape of a ship exercises in lessening the resistance of water to its motion, and to its influence in giving or withholding buoyancy and stability. It is surprising that ship-builders have not discovered these laws. I will concisely describe them." He then proceeds to enlighten the world on the laws of fluid motion, and to construct the perfect ship, saying very modestly, in conclusion, "The patentee having shown the defective formation of existing ships, and explained the principles of the new form wherein are centred all the eminent qualities a perfect ship should possess; namely, the form of least resistance, the highest degree of stability and buoyancy, the finest steering qualities and the highest degree of safety and convenience, particularly for passengers,—he will conclude by expressing his strong conviction, from a lengthened study of the subject, that his improved form will be adopted in all new ships." He does not seem quite certain that it will be so, for he goes on: "but, nevertheless, being simply an hydraulist, and without experience in nautical matters, he is somewhat distrustful of his own judgment; he would, therefore, feel extremely obliged if nautical men will be so kind as to express to the patentee their opinion as to the soundness or unsoundness of his views."

The principle of the construction is, to increase the length and breadth, and diminish the depth of ships, the bottom being an inclined plane, starting from the water's surface at the bows, reaching its greatest depth just abaft the mizen mast, where it is met by another inclined plane starting from the water's surface at the stern-post. These two planes are tapered off at the extremities,

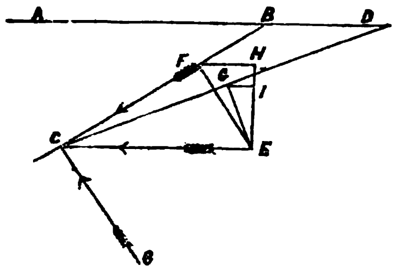
but have nearly the same area as the section of the ship at the water's surface. His reasons for adopting this form are, that "if a flat-fronted body, when moving" directly "through the water, meets with a resistance of 8,000 lbs., it will meet with only half the resistance, provided an inclined plane be added to its front, the same length as its greatest depth, and only one-fourth the resistance, if the length of that inclined plane be doubled," and so on; "and only one thirty-secondth part, that is, 250 lbs., when lengthened sixteen times." But "were a ship upon the common wedge principle to have bows in length four times the greatest width, so as to reduce the resistance of the water from 8,000 lbs. to 1,000 lbs., she would be very unsafe in a rough sea; whereas, were she to be constructed on the patentee's principle of the inclined plane, she might advantageously have the length of the incline even as much as 16 times more than its greatest depth, thereby reducing the resistance of the water to its motion, from 8,000 lbs. to 250 lbs. The resistance" which ships upon the common principle "meet with when moving through the water is lessened in proportion as their bows exceed in length their greatest *width*; whereas the resistance of the water to the patentee's new form of ships is lessened in proportion as the length of the long bow exceeds its greatest *depth*. This is a grand and valuable feature, as any convenient width can be given to the ship for the obtainment of cargo room; the width giving her a high degree of buoyancy and stability, while possessing the requisite form for the highest rate of speed."

What does all this amount to? The patentee talks in the first place of getting a large amount of buoyancy and stability, and for this purpose he has thought it advisable to construct his ship (as per engraving) with a breadth equal to one-third of the length, and, in accordance with his principle, has reduced the depth in proportion thereto. Let L, B, and D be the length, breadth, and depth of a vessel, with a flat bottom like his, but having the ordinary dimensions—L being about six times B—and let us seek to apply his principle, retaining the same displacement, so that she may carry the same cargo. These three quantities will be the only ones that will vary in the expression for the displacement, and therefore $L \times B \times D$ may be taken to represent it. If B, in the proposed case, is to be double that in the given vessel—let L be constant—then D must be one-half that given; so that although the diminution of D will halve the resistance, the increase of B will double it; and if the length is increased the breadth must be, and what is gained one way is lost the other. Mr. Lipscombe seems to have forgotten that the breadth of the ship has anything to do with the amount of resistance. But even if he could get rid of fluid resistance in this way, he has contrived a most clumsy ship, and has neglected to notice the elements which most engage the attention of the careful builder. Why should he go out of his way to increase a ship's stability so greatly, when she has already a sufficient amount for safety? Does he not know that it is possible to make ships too stable? Some of those in Her Majesty's service have so great stiffness as to endanger the safety of the masts by the suddenness of the recoil. He thinks he has proved "that it is a flat underneath shape, and width combined with length that give the greatest stability." I beg to assure him that a flat underneath shape has nothing to do with the matter; it may be round, hollow, or irregular, with equal advantage. Then again, such a decrease in the depth of the ship would almost prevent her making headway at all when beating to windward, although he may fancy he has got over that difficulty by saying, that "her tendency to be propelled forward would be far greater than her tendency to be driven sideways;" and he makes quite a mistake in supposing that "the deeper the ship the more she tends to be driven out of her course by side currents;" and then is he quite sure that he has patented the whole of his principle, and that he might not write stern for bow, and bow for stern with advantage, so far as speed is concerned? The only consideration he has bestowed on the after part of his ship, is to ensure a shape "that enables the water to maintain the same height behind as in front of the ship." *How* he does not tell us: he does not know, in all probability, that experiments have been made on the forms of ships, in which it has been shown that wedged-shaped bodies, such as those engraved in his tract, from the calculated resistance on which he deduces his conclusion, will go considerably faster in the direction *opposite* to that considered by him. It is recorded, on the experiments made by L'Abbé Bossut, M. D'Alembert, and the Marquis de Condorcet, that a wedged-shaped body, which was made by a certain weight to travel 50 feet in 16 seconds, when the sharp end was first, went the same distance in 11½ seconds when reversed. Again, the whole of the resistances ascribed so confidently to the effect of the fluid on the several forms he has given are wrong: it is not true, that in "wedges moving through water their resistance is lessened in proportion as their length exceeds their greatest width;" since

he has shown, that by resistance, he means that force which opposes an onward motion of the vessel.

Let us explain this—

Let A B C and A D C be two wedges moving through the water with such a velo-



city, that the point C in each would reach E in one second; then the resistance of the fluid, depending on the length of this line, may be properly represented by it. Now, draw E F and E G perpendicular to the faces of the wedges, and it will be seen at once, that if the point C were free to move, it would move at the same rate, and in the same direction under the united influence of the thrusts F C and *e* C (where *e* C is equal and parallel to E F), as if acted upon by the thrust E C: the two forces, F C and E F are therefore the components of E C; but (neglecting friction) F C does nothing towards retarding the wedge; E F is the effective thrust on it. Similarly, E G is the effective thrust on the other wedge, and these are the forces (varying with the sine of inclination) which Mr. Lipscombe has considered as retarding the progress of the wedges in the direction, E C; but it will be seen at once that, just as before, the components of E F are E H and H F, of which E H is vertical and non-effective. H F is the only part of E C, which retards the progress of the wedge, A B C, and I G that of the wedge, A D C; and if any one will take the trouble to measure F H, G I, E F, and E G, he will find the relation between them to be $FH : GI :: EF^2 : EG^2$: (that is, in mathematical language, the effective resistance varies with the square of the normal velocity.) The error here pointed out will vitiate the whole of his calculations; yet not to so great an extent, probably, as another, arising from the assumption that E F represents the whole effect of E C. All hydrodynamical calculations assume that it does, and for that reason all such calculations are incorrect. The experiments of Colonel Beaufoy, as well as those before referred to, show that the quantities F H and G I increase more rapidly than the squares of E F and E G, and that the error increases with the degree of obliquity and the velocity of the wedge. The French models did not attain a higher velocity than three miles an hour; yet at such low rates the increase of the error with the speed is very marked.

Let me assure Mr. Lipscombe, in conclusion, that the very highest mathematical talent has been devoted to this most difficult subject; with but partial success, it must be admitted, yet with such as to leave his fancied discoveries far in the rear of our present position. If he should feel himself obliged to acknowledge the correctness of the few remarks I have made, he may console himself with the reflection, that where the most eminent men of modern times are compelled to advance step by step with the greatest possible caution, it were but natural to suppose that such a violent plunge as he has made should carry him beyond his depth. N. B.

Sheerness.

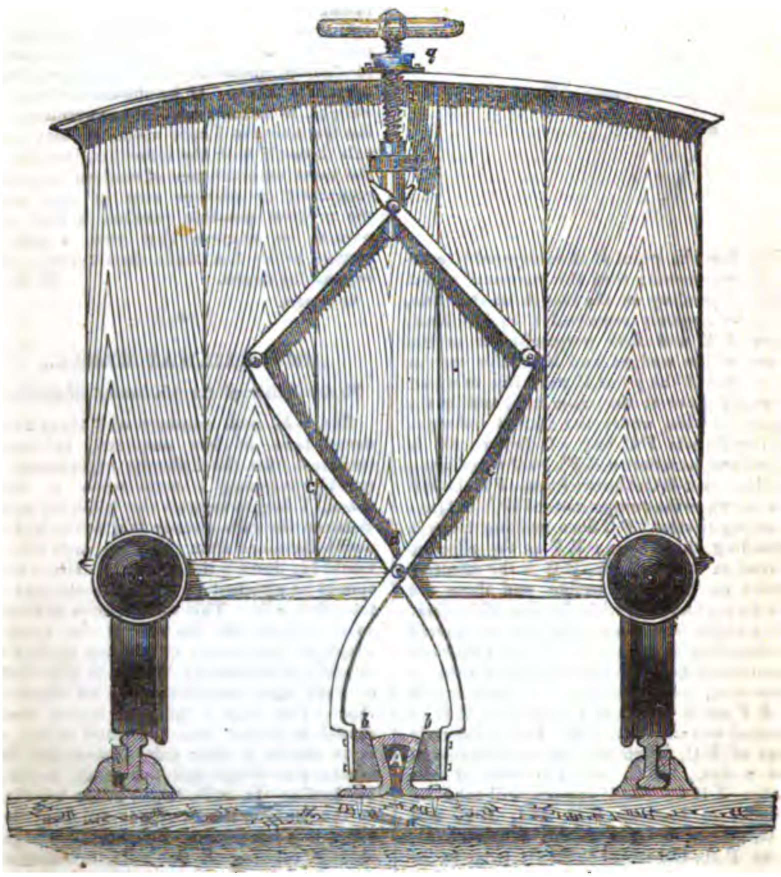
NEW RAILWAY BREAK.

To the Editor of the Mechanics' Magazine.

Sir,—As such numbers of railway accidents have of late occurred, in many instances from the difficulty experienced in quickly stopping a train when at high speed, I beg to suggest the following plan. Between the rails already laid down, and at equal distances from them on each side, I would lay down a third line of rails, which should be attached to the same sleepers as the other rails. This third line is to be set apart entirely for the use of the breaks, which are not to act on the top surface of the rails, as at present, but are to grip them on each side, something like an inverted vice. The rails I propose laying down should be higher than those now in use, so as to obtain a clear side surface for the breaks, free of nuts and bolt-heads, &c. &c. By having the rails larger at the top than at the bottom, the carriages are kept tied down, as it were, to the line, and the danger of their running off the rails, or rising off them, is quite done away with. When not in use, the breaks will be kept screwed down to within a quarter of an inch of the rail on either side, and from the peculiar wedge-like shape of the rails the least inclination of the carriages to leave the line in any direction will be immediately checked by the breaks coming in contact with this centre line. One of these breaks should be attached to every tender and carriage, to act simultaneously or independently, by means of connecting-rods, so that the engine-driver or guard could turn on

all the breaks at once, if the immediate stopping of the train were necessary. This kind of break would be found very serviceable in going down steep inclines, or when the rails are slippery from wet, frost, and other causes. No chairs will be required for these rails, as they will have a broad flange, which will rest directly on the sleepers, to which the rail will be fixed, by means of screw bolts, partly countersunk in the flange, to allow the breaks to run freely.

To further aid the explanation of my plan, I subjoin the following figure, in



which A is the break-rail (to be hollow); *b b* are blocks of wood, screwed on to the break-rods, *c c*, which move on a fixed spindle, *d*. *e* is a guide-collar to the screw-rod, *f*; *g*, a nut, through which the screw passes. By screwing down the handle, the blocks *b b* are put out of gear; the contrary, of course, tightens the blocks against the face of the rails.

The advantages over any other kind that I apprehend these breaks will possess, are—1st. The use of a separate line of rails for the purpose of stopping a train; thereby a saving of the wheels and rails obtained.

2nd. A far greater control than in the ordinary breaks over the speed of trains, which can be checked nearly immediately.

3rd. The danger of a train running, or rising of the line is very nearly impossible, unless *all* the breaks smash.

4th. That in going down inclines, or in

case of rails being slippery, these breaks are far superior to any now in use.

The means of communicating between the engine-driver and guard has always been a source of difficulty: allow me to offer the following plan, which I do not think has ever been thought of. Along the tops of the carriages, and connected with each other by simple hooks and eyes, I would have a number of rods running through guide-blocks or grooves, one rod to each carriage; this string of rods should be connected at one end to the steam whistle on the engine, the other end to communicate with the guard, who, by means of a lever-handle, could give immediate warning to the engine-driver in case of danger. It might act as a code of signals; one whistle, turn off steam and stop the train; two whistles, go easy; three, go a-head. It would be better to have a separate whistle for these rods.

I am, Sir, yours, &c.,

R. Henry.

Bombay, Parelle, Dec. 14, 1853.

ASCENSION IN BALLOONS.

To the Editor of the Mechanics' Magazine.

Sir,—If a key or any small weight be tied to the end of a long cord which is held in the hand, and if a rapid circular motion be given to the key by the movement of the hand, the key will ascend, in describing a large circular path, and will ultimately revolve on the same level with the hand that holds the cord. Some useful applications of this principle may perhaps be adopted in ballooning.

In Dr. M'Sweeny's "Essay on Aërial Navigation," occurs the following: — "Writers are not agreed to account for the standing of a spinning top. Boys say that the top presses lightly on the hand as it spins well. It has been denied that in a balance it would weigh lighter than a top at rest. When there is a hole in the bottom of a car, through which an aëronaut can protrude his arm, he can give a rapid circular motion to a weight at the end of a rope. Some would maintain that a balloon would remain at the same elevation whether the weight was made to describe a circular path or to remain suspended."

He does not say whether the experiment has been tried or not. Some practical aëronaut will, perhaps, inform us whether the experiment has been tried, and some mathematical contributor to the *Mechanics' Magazine* calculate what would be the effect of a weight of 5 lbs. at the end of a rope 10 feet in length, held in the hand of the aëronaut who protrudes his arm out through a hole in the bottom of the car and gives the weight as rapid a circular movement as the rope will permit. Will the effect be to make the balloon rise during the operation of the centrifugal force, just as if 5 lbs. of sand were discharged? The saving of gas and of ballast is of great moment in aërostation; and a temporary increase of elevation, without loss of ballast, may be often of importance to an aëronaut wishing to take a more extended view of a country; for instance, to see whether he was approaching the sea.

It is not easy to think that a weight describing a circular path on the same level with the bottom of the car, could have the same effect on the balloon as if it were to hang vertically. The increasing interest now taken in ballooning may lead to experiments of various kinds. The attention of some may be directed to this suggestion probably with advantage. The impression on most minds will be, I fancy, that the balloon will rise while the weight has the centrifugal force communicated to it. If any fallacy exists in this problem, the pointing of it out may be of use, and may, perhaps, suggest some new considerations. If the principle be admitted to be correct, this may lead to experiment, and thus to the adoption of a speedy way of rising in the air for a temporary purpose.

I remain, Sir, yours, &c.,

Senex.

Jan. 18, 1854.

THE PROBLEM IN NAVAL ARCHITECTURE.*

To the Editor of the Mechanics' Magazine.

Sir,—I find, on further looking at the problem proposed by Mr. Barnaby, that I misapprehended its object, and have, consequently, done him an injustice. The point determined by drawing the line perpendicular to the edge of the scale to the line *a b*, is that which is required for putting on the planking. Looking at the question too hastily, I had imagined he was determining the extremity of the normal which he draws to the ship's surface. This point, however, is of no use for the object in question. Should a series of such points be determined and a curve passed through them, we should obtain the projection of a curve, which is the locus of the feet of the perpendiculars to all points in a level line, at the distance of the thickness of plank; but this would not generally be a plane curve at all,

* We have received a communication from Mr. Barnaby, in reply to "A Constant Reader's" previous letter; but we think the above explanation renders its publication unnecessary.—Ed. M. M.

and it would be at some distance *below* the level line.

Mr. Barnaby's operation amounts to this. He obtains the projection of the normal to the surface. He then throws it down, with its horizontally projecting plane round its trace, on the half-breadth plan, on that plane, and measures off on the normal so found the thickness of the planking.

Now for a *small distance*, the surface both at the plank and timber-line may be considered a portion of the touching planes. The section of this plane at the timber-line made by the horizontally projecting plane of the normal, must be a straight line perpendicular to the normal: hence, the line drawn perpendicular to the edge of the scale is this line. In restoring this plane to its original place, the point *c*, where this line cuts *a b*, will remain fixed. It is therefore at once a point in the timber-line and the level-line, and therefore the point required. It will generally fall at so small a distance from the foot of the normal, that no sensible error will be committed in taking this point in the tangent plane for a point in the timber-line itself. The point where this same plane cuts the "station" is sometimes taken for a point in the timber-line. Generally, however, I think a greater error will be committed by adopting this than the point determined by Mr. Barnaby. I am glad to have this opportunity of correcting my misapprehension of that gentleman's problem.

I am, Sir, yours, &c.,
A CONSTANT READER.

London, Jan. 24, 1854.

ON THE APPLICATION OF AIR-CHAMBERS TO THE SUCTION-PIPES OF PUMPS.

To the Editor of the Mechanics' Magazine.

SIR,—I am sorry to find, from the communication of "Hydraulicus," in your last Number (page 61), that he has failed to gather the information intended to be conveyed by my paper upon the above subject, in your No. 1581, for November last.

"Hydraulicus" says, "I do not see the absolute necessity of a third valve, as shown in Mr. Baddeley's figures." If "Hydraulicus" will again read attentively my extract from the Rev. H. Moseley's report, he will, I think, see that without the third valve, the "surplus work" could not be "stored up" in the air-chamber "to help to begin the next stroke of the piston."

The motion given to the column of water in the feed-pipe expends itself, as I before observed, in the air-chamber, and the water is only prevented from flowing back again to the well by the third valve. Were it not for this valve, an oscillating motion would ensue in the feed-pipe, the column of water moving in a downward direction, probably at the moment the piston was ascending, creating an opposing force, in which case the air-chamber would be almost worse than useless.

"Hydraulicus" says, "The piston descends, and the second valve is shut; but the third valve remains open, and the water from the pipe flows into the air-chamber." Yes, but only until the momentum of the water is expended, when the valve closes, and is not, as "Hydraulicus" represents, "always open." As the piston makes its upward stroke, the foot valve of the pump first opens, and a portion of the water is drawn from that stored up in the air-chamber, immediately followed by the opening of the third valve and the ascent of water in the feed-pipe. The supply of water to the pump-barrel is first from the air-chamber, and afterwards from the feed-pipe; just the reverse of what "Hydraulicus" describes.

Unfortunately, "Hydraulicus" is not alone in the erroneous view he takes of the operation of suction air-chambers, several remarkable failures having attended the introduction of these appendages, from the absence of the third valve, by which alone their advantages can be secured.

In the case of the pump described by "Hydraulicus," I should prefer to place the third valve near the lower end of the feed-pipe.

I am, Sir, yours, &c.,
WM. BADDELEY.

13, Angell-terrace, Islington, Jan. 23, 1854.

"W. T.'S" NEW THEORY OF ELECTRICITY.

To the Editor of the Mechanics' Magazine.

SIR,—As you were kind enough to insert my first communication upon a new theory of electricity, I will trouble you with a few further illustrations.

Admitting the hypothesis that atomic motion is electricity, and that it cannot be retrogressive,—that, like every other phenomenon resulting from a natural law, although subject to interruptions, it has one uniform direction, which direction must be continuous, it follows that this electricity must move in a circuit; so that in all masses

of matter, as the earth, for instance, there would be one uniform progressive motion, going in one direction, and returning in another; in fact, wherever, or from whatever direction the first impulsions came, the motion would resolve itself into one distinguished by uniformity; therefore, as it could not preserve its uniformity by crossing the line of its direction, it would necessarily pass in the direction of its poles, travelling back over the surface. Indeed, the earth would be one gigantic electrical-machine—the current passing out at one of its poles into the atmosphere, and passing over its surface, like the lines of longitude, causing the compass always to point in one direction, and even occasioning the dip of the needle as it approached the pole, as the motion would be in a direction slanting upwards from the earth for a great distance around the pole.

From the same cause would spring all the phenomena of the aurora borealis; for, as intense electric motion produces both light and heat, it is evident that, as the current was communicated to the atmosphere at the pole, it would be most intense there, decreasing in brilliancy as it approached the equator from its becoming more diffused. A common electrical machine will illustrate this; having atomic motion given to its circumference by friction, the motion is collected and concentrated through its centre, in the direction of its poles, giving out the same scintillations as the aurora borealis, on a small scale; its irregularity being accounted for by its being most intense when the earth is overcharged—equilibrium being restored by its being given out into space.

The electric current will always be most diffused, and its effects the least, in passing over the earth; and in its return through its centre, its concentrated effects will be most intense, producing the fiercest light and heat. And this would be the case with every planet revolving on its axis. Proceeding thus from less to greater, we see that the sun itself, being the centre of large bodies revolving round it, is a concentration of their collected motion—a centre of light and heat; and so with all the fixed stars; they are the centres of motion of large masses of matter; and their scintillations will be accounted for in the same manner as those of the aurora borealis; and the brightness of a star will depend on its density, as, of course, the centre of a system would be luminous, even though it did not consist of solid matter.

Fearing I am trespassing too much on your valuable space,

I am, Sir, yours, &c.,
W. T.

Islington, Jan. 28, 1854.

REVOLVING SLIDE-REST.

To the Editor of the Mechanics' Magazine.

SIR,—In reply to the communication of your correspondent "Artifex," p. 34, I beg to state, that having, in the year 1838, disposed of my invention of "Hemispherical Joints,* with the revolving slide-rest for producing the same," to Messrs. Lambert and Son, who considered a publication thereof not consistent with their interests, I have been unable to realise the hope expressed at p. 267 of your twenty-ninth volume.

I am, Sir, yours, &c.,
WILLIAM BADDELEY.

13, Angell-terrace, Islington, Jan. 23, 1854.

HYDROSTATICAL PROBLEM.

To the Editor of the Mechanics' Magazine.

SIR,—I have a prism of wood of half the specific gravity of water. Its section is a quadrilateral figure, the two longer sides of which are parallel; the others are in length a and b respectively. How can I find, by calculation, the line at which the body will float in equilibrium? I shall be much obliged to any of your mathematical correspondents who will favour me with a sketch of the method of investigating this question, and am,

Sir, yours, &c.,
G. N.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

SAMUELSON, MARTIN, of Hull, York, engineer. *Improvements in the manufacture of bricks and other articles from plastic materials.* Patent dated July 12, 1853. (No. 1657.)

This invention relates to the application of hydraulic power to the working of brick and tile-moulding machines.

FLETCHER, JAMES, of Facit, near Rochdale, Lancaster, manager. *Certain improvements in machinery used for spinning, doubling, and winding cotton, wool, flax, silk, and other fibrous materials.* Patent dated July 12, 1853. (No. 1658.)

Claims.—1. The general arrangement of throstle-spinning and doubling-frames, having the rollers and guides-wires arranged, as described. 2. The covering of the parts of the spindles in throstle-spinning and doubling-frames between the two rails, and an arrangement for stopping the spindle when required. 3. A mode of driving two

* Described in *Mech. Mag.*, vol. xxx., p. 365.

spindles by one band in doubling-frames and winding-machines.

SNOWDEN, WILLIAM FRANCIS, of Weymouth, Dorset, mechanist. *An improved mangle.* Patent dated July 12, 1853. (No. 1659.)

Claim.—The application to mangles of a second table, to be carried by the traversing weighted-box, and of a roller pressing thereon, and caused to revolve by the friction between it and the said table.

GROVER, HENRY MONTAGUE, of Hitcham Rectory, Buckingham, clerk. *A new method of finding and indicating the measurements of the sines and cosines of the arcs of circles or other peripheries.* Patent dated July 13, 1853. (No. 1661.)

This invention consists in the mechanical application of the chords or subtense lines of one circle to the measuring of the sines or half chords of another circle, double the magnitude of the former.

BAKEWELL, THOMAS HILL, of Dishley, Leicestershire. *Improvements in ventilating mines.* Patent dated July 13, 1853. (No. 1663.)

The machine constructed by the inventor consists of several divisions, either two, three, or four, according to the quantity of air required, which will generally be regulated by the size of the mine ventilated. Each division has two wings and one body, each wing being of the same length, breadth, &c., as the other. The body, in breadth, will generally be about one-fifth of the length of the wing. The ventilation is to be effected both by the exhaustion of the vitiated air, and the forcing in of fresh.

RANSOME, FREDERICK, of Ipswich. *Improvements in the manufacture of artificial stone, and similar wares.* Patent dated July 13, 1853. (No. 1666.)

"In the manufacture of artificial stone, and such like wares," says the inventor, "by the use of soluble silicate, difficulty has been found in obtaining soda free from impurities, particularly from sulphuric acid, which is apt to produce an efflorescence from the stone under variations of the atmosphere. Now my invention consists of employing baryta, or salts of baryta, or any of the salts of lead, to neutralize such impurities; and I find such artificial stone considerably improved by exposing it, when moulded, to a bright red heat, in a suitable muffle or kiln."

MORTON, ARNOLD, of Cockerill's-buildings, Bartholomew-close, London, colour-manufacturer. *Improvements in the manufacture of paints, pigments, and materials for house-painting, paper-staining, and decorative purposes generally.* Patent dated July 13, 1853. (No. 1667.)

Instead of the usual linseed oils, the inventor substitutes boiled or raw spirits of turpentine, and dryers of every description, in the manufacture of paints and pigments, and likewise in all gums and sizes at present in use for paper-staining and colouring of nearly every description. The exact proportions in all cases cannot be precisely stated, as they, of course, depend on the strength of the chemicals employed.

NEEDHAM, WILLIAM, of Smallbury-green, Middlesex, manufacturer, and JAMES KITE, the younger, of Princes-street, Lambeth, Surrey, engineer. *Improvements in machinery and apparatus for expressing liquid or moisture from substances.* Patent dated July 14, 1853. (No. 1669.)

According to this invention the moisture is expressed from substances by means of a number of slabs made of wood, metal, gutta percha, earthenware, or any other suitable material, or of a combination of materials dissimilarly prepared or otherwise arranged. On both sides of the slabs are cut rectangular grooves or channels, the transverse sections of which will vary according to the nature of the material or materials used singly or in combination, and in some cases it will be found necessary to give a curved form to these sections.

HENDERSON, WILLIAM, of Bow-common, Middlesex, manufacturing chemist. *Improvements in the construction of furnaces for the purpose of obtaining products from ores.* Patent dated July 14, 1853. (No. 1672.)

Claims.—1. The construction of calcining furnaces, with an arrangement of double arches, and corresponding flues and dampers; and the method of heating by equal numbers of fires at each end of the furnace, by which combination a uniform and manageable heat is applied. 2. The use of such furnaces for the manufacture of sulphuric acid from copper, tin, zinc, and other sulphurous ores and reguluses, and for the purposes of calcination generally. 3. A described means of obtaining a supply of air, heated to the same degree, or less, than the ores in the furnace. 4. A method of manufacturing sulphuric acid, by combining two or three furnaces, and working them in the manner described.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of Fleet-street, London, Patent agent. *Improvements in the manufacture of anvils.* (A communication.) Patent dated July 14, 1853. (No. 1673.)

Claims.—1. The making of a cast-iron anvil having a steel face and horn, or a face of steel and a horn of malleable or wrought iron, welded thereto as described. 2. A tempering aperture in the body of the cast-iron, as described.

HUMPHERY, GEORGE, of Brighton, Sus-

sex, engineer. *Improvements in regulating the supply of water for water-closets.* Patent dated July 14, 1853. (No. 1675.)

These improvements relate to the construction of the supply-box. On the spindle of the inlet valve is keyed a quadrant, the teeth of which are in gear with those of another. The top of the outlet valve is connected by a pin to the connecting-rod, which is secured to a lever that is keyed to a spindle. The second quadrant is also keyed to the same spindle, so that its motion actuates both valves. One end of the spindle works in a box cast on the side of the supply-box, and the other end is carried through a stuffing-box, screwed into the opposite side of the supply-box. On the outer end of the spindle is keyed a lever, to which a rod and handle for actuating the valves are attached. When this lever is lifted the induction passage is shut, the eduction valve raised, and the quantity of water the box contains discharged into the soil-pan.

Bartleet, Robert Smith, of Redditch. *Improvements in the manufacture of sewing-machine needles.* Patent dated July 14, 1853. (No. 1676.)

This invention consists in forming the stems of sewing-machine needles, when such stems are smaller at one end than the other, by stamping or pressing in dies, instead of by the ordinary grinding and filing. The dies used for this purpose are made of steel, and the steel wire of the proper length is placed between them, and by stamping or pressing the dies together the desired form is obtained in the rough, and is then finished into a needle by filing and grinding. It also consists in forming the points and grooves, and impressions for the eyes of such needles simultaneously, by stamping or pressing in dies. The inventor also makes sewing-machine needles, which have points with angular sides, or lancet points, or with two convex sides, either with or without cutting edges, and either with or without grooves or recesses for the thread; and also needles with knobs at their ends. He burnishes the eyes of needles by threading them on a wire, and causing them to revolve and slide rapidly thereon; or the needles may be stationary, and the wire made to revolve in and slide rapidly through the eyes.

Yule, John, of North Wellington-street, Glasgow. *Improvements in rotary engines.* Patent dated January 14, 1853. (No. 1677.)

This invention relates to rotary engines in which slides or stops are employed.

Claims.—1. The making of guides or grooves in the covers to guide the slide or stop into and from the cylinder.—2. The giving motion to the slide or stop by means of a shaft receiving motion from the main shaft.—3. The constructing the outer and inner cylinders in halves to facilitate the removal of and the getting at the parts for repairs.

Little, William, of the Strand, Middlesex. *Improvements in the manufacture of lubricating matters.* Patent dated July 14, 1853. (No. 1678.)

Claim.—"The combination of the coal oil, or a heavier oily product, resulting from the second distillation of bituminous coal, or a matter that will so produce a like oil, with a saponified vegetable, animal, or fish oil, or fat; and whether the coal oil be combined with the vegetable, animal, or fish oil, or fat, after, or during the saponifying process; the said composition being intended as a lubricator for machinery."

Looker, jun., Benjamin, of Kingston-on-Thames, Surrey. *Improvements in the manufacture of bricks.* Patent dated July 14, 1853. (No. 1679.)

The inventor says, "In building it is often necessary to divide a brick into parts, and the object of this invention is to facilitate such dividing of bricks to save labour, and, as much as may be, to prevent waste; and the invention consists of making bricks with transverse slits or openings through them at those parts where it is desired they should be divided."

Gowland, George, of South Castle-street, Liverpool, Lancaster, chronometer and nautical-instrument maker. *Improvements in certain nautical and surveying instruments.* Patent dated June 15, 1853. (No. 1681.)

The inventor constructs a compass with the points or graduations marked on the exterior periphery of the zone-shaped card, instead of upon the upper surface of the flat card, and is thereby enabled to raise the compass to a considerable height above the deck of the vessel, and thus to diminish the effect of the local attraction of the iron-work of the vessel, and at the same time the indications are rendered very distinct, and the steersman is enabled to see both the head of the vessel and the compass with a much less movement of his eye.

Gordon, Robert, of Heaton Norris, Lancaster, millwright and engineer. *Improvements in furnaces used with steam boilers for the purpose of consuming smoke and economizing fuel.* Patent dated July 15, 1853. (No. 1682.)

In Mr. Gordon's furnace, when the fuel is deposited in the hopper at the furnace-mouth, it is slowly conveyed forward, during its combustion, on the upper surface of revolving cylinders, until it is expended and

deposited in the state of ash just before it arrives at the bridge-grate. The air required for the complete combustion of the fuel is supplied through hollow shafts, and through openings in several discs. The speed at which the cylinders revolve is adjusted so as to allow the complete combustion of the fuel to take place during its transit from the furnace-mouth to the bridge-grate.

D'HUART, HENRI JOSEPH, of Longwy, France. *Certain improvements in the manufacture of pottery.* Patent dated July 15, 1853. (No. 1683.)

Claim.—The application of callipers or sweeps in the manufacture of any kind of article in ceramic clay, such callipers or sweeps being fixed, or having a rotatory motion; and the combined application of these sweeps with the up-and-down and intermitting rotary motion of the moulds, or with rotary motion only.

LIDDELL, CHARLES, of Abingdon-street, Westminster, esquire. *Improvements in moving boats on canals and rivers.* Patent dated July 15, 1853. (No. 1685.)

Claims.—1. A method of moving boats on rivers and canals by means of fixed engines and endless wire ropes, working above water, to which ropes the tow-lines of the boats are directly attached, as described. —2. An arrangement and adaptation of sheaves and guards.

BESSEMER, HENRY, of Baxter-house, Old St. Pancras-road, Middlesex, engineer. *Improvements in the process of refining and manufacturing sugar.* Patent dated July 15, 1853. (No. 1687.)

These improvements consist in separating the whole or greater part of the glucose matter or uncrystallizable coloured syrups from sugar prior to the manufacture of it into loaves, or concrete masses, instead of separating such matters after the loaf of sugar has been formed, as heretofore practised in refining sugar, so that the process of liquoring or claying the loaf may be wholly or in part dispensed with, and in other related arrangements.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in spreading or applying India-rubber, or compositions of India-rubber on fabrics.* Patent dated July 15, 1853. (No. 1688.)

This invention is principally applicable to coarse fabrics, the object being to render it waterproof without impregnating and filling up the interstices, and consists of passing the fabric with undissolved India-rubber between two heated rollers driven with unequal velocities, by which means a thin coat will be caused to adhere to the prominent parts of the surface of the fabric, and a very thin sheet of India-rubber, or a very thin fabric of fibrous India-rubber is then caused to adhere to the former coat by pressure between other rollers.

BESSEMER, HENRY, of Baxter-house, Old St. Pancras-road, Middlesex, engineer. *Improvements in the manufacture and treatment of bastard sugar and other low saccharine products, such as are obtained from molasses and scums.* Patent dated July 15, 1853. (No. 1689.)

Claims.—1. The combined agency of heat and pressure for the purpose of separating the solid from the fluid parts of bastard sugar and other low products, obtained in the manufacture and refining of sugar. 2. Increasing the density of sugar solutions in the process of evaporation beyond the point which will admit of the drainage of the syrup from them by the action of gravity, and also cooling the same below the temperature which would admit of a like drainage by the same means, when such cooled and concentrated matters are to be subjected to pressure and heat for the purpose of separating the glucose matter therefrom. 3. The use of shallow trays for crystallizing cakes of sugar that are afterwards to be pressed for the purpose of separating the glucose matters therefrom. 4. Dissolving pressed cakes of bastard sugar in a filtered solution of raw sugar, in order that such bastard sugar may form part of the refined products.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in the manufacture of brushes and substitutes for bristles.* Patent dated July 15, 1853. (No. 1690.)

This invention consists—1. In forming the handles and backs of brushes by combining India-rubber and sulphur, with or without other matters, and subjecting the compound to heat till it is changed into a hard substance; and, 2. In forcing such compound through perforations in metal plates, so as to obtain it, when subjected to heat, in such a state as fits it to be used as bristles.

BESSEMER, HENRY, of Baxter-house, Old St. Pancras-road, Middlesex, engineer. *Improvements in the manufacture and refining of sugar.* Patent dated July 15, 1853. (No. 1691.)

The inventor constructs cylindrical sugar-loaf moulds having a moveable bottom, so that the syrups may drain off from a surface whose area is equal to the body of the mould, whereby the mould may be made of a much greater height, because this increased area of outlet will allow the syrups to drain off quickly, which the hydrostatic pressure of a tall column also materially assists; this increased capacity of the mould will render it much too heavy to be handled by the workmen in the usual way, Mr.

Bessemer, therefore, prefers to make them fixtures, or moveable only with revolving apparatus, somewhat like a turn-table, and instead of detaching the loaf from the mould by a blow, he employs an hydraulic press or other suitable mechanical force to push out the loaf from the mould.

TAYLOR, ISAAC, of Stanford Rivers, Essex, gentleman. *Improvements in machinery for printing.* Patent dated July 15, 1853. (No. 1692.)

Claim.—The employing three cylinders, or any combination of sets of three cylinders, the axes of which are always parallel, one of the three being freely deposited between the other two, from one or both of which it receives rotary motion by contact and pressure, the nip which it undergoes being greater in proportion as its position between them is lower in relation to the horizontal diameter of the sustaining cylinders.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in the manufacture of pens, pencils, and instruments used when writing, marking, and drawing.* Patent dated July 15, 1853. (No. 1693.)

This invention consists in the employment of India-rubber in constructing the articles named in the title. The inventor combines the India-rubber with sulphur, with or without other matters, and subjects the same to heat in order to obtain a hard substance. He also combines slate-powder or other such matter with India-rubber, and thus obtains sheets for the purpose.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in preparing India-rubber.* Patent dated July 15, 1853. (No. 1694.)

Claim.—The subjecting India-rubber in a divided state to an alkaline or acid process, for the purpose of cleansing it of impurities.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in the manufacture of beds, seats, and other hollow flexible articles to contain air.* Patent dated July 15, 1853. (No. 1695.)

This invention consists in employing knit or looped fabrics in making articles to contain air; two surfaces of such fabrics are coated with cement, and they are caused to adhere at intervals; but where the hollow cells are to be, paper is interposed to prevent adhesion, and bands of non-elastic fabrics are cemented between the fabrics to separate the cells. The cells may all be connected by a vulcanized India-rubber pipe, and be inflated by a tube; or each row of cells may be inflated separately.

JELIE, JEAN BAPTISTE, of Alost, Belgium, thread manufacturer. *Improved machinery for dressing or polishing thread.* Patent dated July 15, 1853. (No. 1696.)

Claim.—The use of a moveable frame, in which two sets of hanks may be placed, one on each side of the brushing-cylinder, so that while the brushes are operating on the hanks on one side, the attendant may be removing the finished hanks from the other, and supplying the machine with fresh ones in their place, thereby greatly economizing time, as the machine need never stand idle.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improvements in machinery or apparatus for digging, excavating, and removing earth.* Patent dated July 15, 1853. (No. 1697.)

Claim.—The use of a rotating drum or wheel, armed with scoops or shovels, in combination with a close case or chamber, in which the scoops or shovels are made to rotate, so that the loose earth or soil, when collected or gathered by the lower end of the case, may be carried up to the upper part of the close case, from whence it is thrown out either into inclined side wings or otherwise.

FAYERMAN, EDMUND REYNOLDS, of Shaftesbury-crescent, Middlesex, gentleman. *A method of and instrument for keeping time in music.* Patent dated July 16, 1853. (No 1698.)

This invention relates to a system of dialling for keeping time in musical performances. The inventor employs moveable half-dials and hands for exhibiting the music measures and changes at pleasure; an adjustable pendulum for making an immediate change of time without stopping the motion, and enabling time to be accelerated or retarded at pleasure; strikes for any bar of music in union with the dial; and a stop for making pauses at any vibration.

LAMPLOUGH, HENRY, of Gray's-inn-lane. *Improvements in the preparation and manufacture of certain effervescing beverages.* Patent dated July 16, 1853. (No. 1699.)

Claim.—The use of concentrated anhydrous acids, citric acid and its compounds, or fruit acids, all when deprived of water, with alkaline matters when dried or rendered anhydrous, either with or without the use of solidified carbonic acid, in the manufacture of certain effervescing beverages.

RIVES, JACQUES, of Hotel Motay, Rue Motay, Paris. *Improvements in trusses for the cure or alleviation of hernia.* Patent dated July 16, 1853. (No. 1700.)

Claim.—The combination of two pads with a spring, a cross-piece, and a belt, as described; also a manner of applying the pressure beneath the upper surface of the pad, as described.

BURROWS, BENJAMIN, of Leicester, de-

signer. *Improvements in Jacquard apparatus.* Patent dated July 16, 1853. (No. 1701.)

This invention has for its object the arrangement of Jacquard apparatus in a manner suitable for opening two sheds simultaneously or separately, for the passage of two shuttles, one on each side of a central warp. For this purpose the usual lifting wires are employed, and those which are selected by the cards are moved up by the griff or frame to make the upper shed in a similar manner to that ordinarily practised; but the perforated board, on which the lower ends of the lifting wires rest, is caused to descend, together with the unselected wires, by which means a lower shed is opened simultaneously with the upper one, thus admitting of two shuttles being thrown across, the one under and the other over a middle warp; by cross mounting and giving separate movements to these parts, varied effects may be produced, and two sheds opened, according to the effect desired to be obtained.

NAYLOR, JAMES, of Hulme, near Manchester, Lancaster, surveyor. *Improvements in lamps.* Patent dated July 16, 1853. (No. 1702.)

These improvements in lamps applicable to the illumination of streets, roads, and other places by gas, consist in the application of an inverted conical pear or egg-shaped glass, having at each end a suitable opening for the admission of the gas and for ventilation.

COLT, SAMUEL, of Spring-gardens, Middlesex, gentleman. *Improved machinery for boring metals.* Patent dated July 16, 1853. (1703.)

Claims.—1. Mounting the stem of the boring-tool, and the traversing-screw, so that they will admit of being slidden in the direction of their length, for the purpose of withdrawing the tool from its work. 2. A mode of mounting the tools in a rotating frame, for the purpose of bringing them into position, and giving them an independent longitudinal motion. 3. A peculiar construction of chuck, whether it be adapted to produce eccentric or concentric work. 4. A general arrangement of parts, as described, whereby the inventor is enabled simultaneously to form holes or openings in a line with and at an angle to the axes of the cutting-tools.

DUNCAN, JOHN WALLACE, of Grove-end-road, St. John's-wood, Middlesex, gentleman. *Improvements in adhesive soles and heels for boots and shoes, and in apparatus used for preparing and applying the same.* Patent dated July 16, 1853. (No. 1705.)

Claims.—1. Manufacturing soles and heels with a preparatory adhesive surface. 2. Golosh soles, fashioned so that the lower part of the boot or shoe may be fitted and encased. 3. Perforating soles and heels, formed of leather, gutta percha, or other materials that are of a close substance, in order to allow the air or superfluous cementing-matter to escape through the perforations when attaching them to boots or shoes. 4. The insertion of studs through one or more thicknesses of material forming the sole or heel prior to application. 5. The manufacture of soles with flexible vulcanized gutta percha or caoutchouc protruding in relief. 6. An apparatus for holding gutta percha, and keeping the body of it cool while the surface is being heated. 7. An instrument for clearing the bottoms of the boots or shoes preparatory to the application of adhesive soles.

ALEXANDRE, ISAIE, of Birmingham, Warwick, merchant. *Improvements in metallic pens and penholders.* Patent dated July 18, 1853. (No. 1706.)

Claims.—1. Communicating magnetism to steel pens, for the purpose of diminishing the tendency to corrosion therein. 2. The construction of penholders, in which two metals capable of generating a voltaic current by contact with the moist hand are so placed, that on grasping the penholder in writing, they shall cause a voltaic current to pass through the hand of the writer.

BOGGETT, WILLIAM, of St. Martin's-lane, Westminster, gentleman, and WILLIAM SMITH, of Margaret-street, Middlesex, engineer. *Improvements in machines for cleaning and polishing knives.* Patent dated July 18, 1853. (No. 1707.)

Claim.—The construction of knife cleaning and polishing machines, of the class wherein the cleaning and polishing is effected by introducing the knives between eccentric revolving drums or frames, in such manner that the surfaces or frames shall be caused to exert an equal resilient pressure against both sides of the knives introduced between them to be cleaned and polished, by means of the elasticity of the materials of which such drums or frames are composed, or by means of springs applied to and exerting pressure against the opposite sides of such drums or frames. Also, in combination with such arrangement, the use of an adjustable plate to receive and support the handles of the knives to be cleaned or polished.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *A new mode of equilibriating indefinitely the weight of atmospheres.* (A communication.) Patent dated July 18, 1853. (No. 1708.)

This invention consists in the combination of apparatus for applying the elasticity

of the atmosphere, or other gases, as a spring or buffer to deaden shocks, such as those sometimes produced on railways.

WOOD, THOMAS, cotton spinner, and GEORGE WADE, mechanic, both of Sowerby-bridge, York. *Improvements in machinery or apparatus for opening, cleaning, carding, or otherwise preparing cotton or other fibrous materials to be spun.* Patent dated July 19, 1853. (No. 1709.)

Claim.—The stopping or cutting off the current of air caused by the motion of the cylinder of the carding engine.

PERKES, SAMUEL, of Walbrook, City, London, civil engineer. *Improvements in the construction of portable metallic folding bedsteads, chair bedsteads, chairs, sofas, couches, settees, and such like articles, for the use of emigrants and others, and part of which improvements are applicable to ordinary bedsteads, sofas, couches, chairs, and such like articles in general.* Patent dated July 18, 1853. (No. 1710.)

These improvements apply more particularly to articles registered by the inventor, under the Registration of Designs Act, July 27, 1850, and known generally as "Perkes's Patent Folding Bedsteads;" the peculiarity of which principally consists in the two sides being formed in several pieces with a peculiar description of rule-joints, and attached together by means of a series of stay bars rivetted firmly to the sides, end-pieces, and legs, at any required distance apart; the sacking is stretched from end to end and fixed to the end-rails and attached to the sides by means of lacing cords and eye-holes; when required for use the ends and legs have merely to be opened out.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *A new mode of fastening buttons to garments, and an improved button, and also in machinery for manufacturing the same.* (A communication.) Patent dated July 19, 1853. (No. 1712.)

The first part of this invention consists in the employment of an under button, made with a hook, which is passed through the shank of the button, and secures it to the garment without sewing. The second part consists in casting tin or other white metal buttons for uniforms, in lieu of stamping, cutting, and other similar processes which are generally resorted to. The third part consists in certain machinery for manufacturing the said button.

DART, RICHARD, of the firm of Dart and Son, of Bedford-street, Covent-garden, Middlesex, carriage lace manufacturer, and EDWARD SILVERWOOD, weaver. *The adaptation of loom machinery to the purposes of embroidery for badges worn by the police, railway officials, and other officers, and which require a succession of figures.* Patent dated July 19, 1853. (No. 1713.)

This invention consists in the use of the loom for the production of a series of letters and numbers to any extent, without alteration of the original setting up, and is effected by mounting the looms for the nine digits and the cypher, so that any number can be taken and woven into the fabric where required.

BREESE, CHARLES, of Birmingham, Warwick, japanner. *A method of forming designs and patterns upon papier maché, japanned iron, glass, metal, and other surfaces.* Patent dated July 19, 1853. (No. 1714.)

Claim.—The method of forming designs and patterns upon surfaces by printing any required design or pattern in an adhesive matter or composition, which design or pattern so produced is transferred to the surface to be ornamented, and has applied thereon, either before or after transferring, or both before and after transferring, a substance which is capable of resisting the action of acids; whether employed to stop out the action of acids or other agents applied to those parts of the surface not protected by the pattern; whether vitrifiable colours or metals in the state of leaf or powder for burning in, are rubbed into or applied on it; whether colours in the state of powder or metallic powder or metal leaf are applied thereon, or mixed therewith; or, finally, whether employed to protect a surface of gold or silver leaf, all as described.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

ARDASEER, NESSERWANJEE, of Bombay, East India Company's Service. *A method of driving shafting, so as to obtain two revolutions of a screw or other shaft to one revolution of a driving-shaft, or to obtain the converse result.* Patent dated July 12, 1853. (No. 1660.)

This invention is of a character very similar to that of Callen and Ripleys', described page 94, vol. lix.

WILLIAMS, WILLIAM, of Fetter-lane, London, patentee of electric telegraphs. *Improvements in electric-telegraphic instruments.* Patent dated July 13, 1853. No. 1664.)

In this invention a tube, made partly of soft iron and partly of brass, has insulated wire coiled round it, and within the tube is an axis, having fixed thereto two bent magnets, the poles of which are reversed; one of these magnets is near one end of the tube, and the other magnet is near the other end, and the pointing-hand is fixed on the axis.

TABBERNER, JOHN LOUDE, of Lorn-road, North Brixton, Surrey. *Improvements in the manufacture of iron.* Patent dated July 13, 1853. (No. 1665.)

This invention consists in reducing ironstone to powder, and then causing it to be smelted by means of a blast furnace with the aid of fuel and fluxes.

FRYER, ALFRED, of Manchester, Lancaster, sugar-refiner. *Certain improvements in the construction of apparatus for reburning animal charcoal.* Patent dated July 13, 1853. (No. 1668.)

The *first* part of these improvements consists in providing each cooler with a sliding piece capable of being adjusted, so that if the pipes expand unequally by the action of the heat, the lower ends of the coolers may all be brought to one and the same level. The *second* part consists in the application of small plates, boxes, or blocks, to the lower extremity of the coolers, for contracting the width of the lower opening, which plates, boxes, or blocks, are so constructed and fitted that they can be readily removed in the event of any obstruction preventing the flow of the charge. And the *third* part consists in the adaptation to the lower ends of the coolers of a plate, with openings or boxes, capable of sliding upon another plate having intermediate openings or spaces placed above a hopper, or other receptacle, in such manner, that as the openings or boxes become filled by the descending charcoal they can at intervals be moved over the openings in the lower plate, and thus be discharged, at the same time bringing an intermediate set of openings or boxes under the lower apertures of the coolers.

BROWN, THE HONOURABLE SIR RICHARD, Baronet, of Sphinx-lodge, Chelsea, Middlesex. *Improvements in coffins, catacombs, sarcophaguses, and cenotaphs.* Patent dated July 14, 1853. (No. 1670.)

This invention consists in constructing the articles enumerated in the title "of glass, china, earthenware, porcelain, terracotta, or other similar material, and also of prepared peat, or sand, in combination with clay, or peat and mortar, or other adhesive substances of any kind." The inventor also proposes to make these on a new and improved sanitary principle, by constructing them in such a way that the gases evolved by decomposition shall pass through chambers filled with absorbing and disinfecting agents.

CAROSIO, AUGUSTINO, of Genoa, now of Upper Montagu street, Middlesex, doctor of medicine. *A new or improved electro-magnetic apparatus which, with its products, is applicable to the production of motive power.* Patent dated July 14, 1853. (No. 1671).

This invention consists—1. In forming a "combinator" composed of two or more reservoirs, which contain chlorine and hydrogen separately, a communication being effected between them by means of hydrochloric acid.—2. In constructing a "regenerator."—3. In forming a "multiplier;" and, 4, in arranging cylinders and pistons nearly as in the ordinary steam engine, motion being communicated to the pistons by the elastic forces of the hydrogen and chlorine.

ST. ANDRE, ANDRE LOUIS JULES LECHEVALIER, of Albany-street, Regent's-park, gentleman. *Certain improvements in packing goods, so as to increase the facility and safety of their transmission from place to place.* Patent dated July 14, 1853. (No. 1674.)

The inventor's cases are constructed in plates or leaves, united by hinges or joints, capable of being folded together when out of use, and kept together by means of a lock, the same plates or leaves admitting of being opened out into the form of a box or case when required to contain goods for transmission. The lock may be applied either to one of the sides or leaves of the case, or to a metal band or chain passed round the case, and jointed, to admit of its being folded together with the sides or leaves of the case, when necessary.

NASMYTH, JAMES, of Patricroft, near Manchester, Lancaster, engineer. *Certain improvements in the machinery and apparatus employed in rolling plates and bars of iron and other metals.* Patent dated July 15, 1853. (No. 1680.)

The inventor so constructs and arranges the steam engine by which such rolls are driven that he can at pleasure, and at any instant, reverse their motion by means of their valves alone, and consequently reverse the motion of the rolls, so that the work may be passed through such rolls from either side indifferently.

NATHAN, HENRY, of Birmingham, Warwick, jeweller, and SOLOMON ELSNER, of Exeter, optician. *An improvement in spectacle and reading-glasses and pebbles.* Patent dated January 15, 1853. (No. 1686.)

This invention consists in imparting different powers to the same pebble or glass, by taking away a greater portion of the upper or the lower half of the pebble or glass, and leaving the other half thicker, and of greater magnifying power.

DE KERVEGUEN, MARIE GABRIEL ADRIEN ADOUARD LE COUT, of Paris, France, retired naval officer. *An improved construction of wheel for motive power and propelling purposes.* Patent dated July 16, 1853. (No. 1704.)

The object of the present invention is to obviate the carrying up of back water by

the floats, by causing them to enter and leave the water in a vertical, or nearly vertical position, for which purpose the inventor constructs a wheel of a suitable form.

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in gas regulators.* (A communication.) Patent dated July 20, 1853. (No. 1716.)

This invention consists in means of working the cut off valves of gas regulators. It is preferred that such valves should consist of an inverted hollow cylinder of thin metal, and be attached by a wire to a regulating disc, which is in the branch to which the gas passes from the supply main; the pressure on the regulating disc causes the valve to rise, and more or less to close the opening from the main into the branch. Circular valves may be used in the main turning on axes, so as to form partitions across the gas mains when standing across them, and such valves, by reason of being balanced on their axes, may readily be acted on by regulating discs, such as above mentioned; and such regulating discs may be pressed on by graduated springs, or by weights, or by conical or wedge-formed floats working in a fluid.

PROVISIONAL PROTECTIONS.

Dated August 29, 1853.

2004. John Henry Johnson, of Lincoln's-inn-fields, Middlesex. Improvements in the preparation and application of gluten. A communication from François Durand, of Toulouse, France.

Dated November 22, 1853.

2712. Robert Adams, of King William-street, London. Improvements in fire-arms.

Dated December 6, 1853.

2832. George Ross and James Inglis, of Arbroath, North Britain, factory managers. Improvements in looms.

Dated December 30, 1853.

3025. Benjamin Swire, of Ashton-under-Lyne, Lancaster, nail-manufacturer. Improvements in machinery or apparatus for making metal tips for shoes and clogs.

3027. James Marlor, of Oldham, Lancaster, coal-agent. Certain improvements in ascending and descending mines and shafts, and in the apparatus connected therewith, by which said improvements the ventilation of mines is increased.

Dated December 31, 1853.

3029. Isaac Holroyd, of Sowerby-bridge, York, engine-tenter. Improvements in apparatus employed in singeing textile fabrics.

3031. Henry Vernon Physick, of North Bank, Regent's-park. Improvements in electric telegraphs, and apparatus connected therewith.

3033. John Pym, of Pimlico, Middlesex, gentleman. Improvements in machinery for grinding auriferous and other ores, and separating the metal therefrom.

3035. Alfred Trueman, of Swansea, and Isham Baggs, of London. Improvements in grinding, amalgamating, and washing quartz and other matters containing gold.

3037. Joseph Holbrey, of Bradford, York, wool-sorter. Improved machinery for combing wool and other fibrous materials.

3041. Adolphus Oppenheimer, of Manchester, Lancaster, manufacturer. Certain improvements in the manufacture of silk velvet and other such piled goods or fabrics.

3043. Pierre Sonntag, of Paris, France, tailor. An improved apparatus for measuring and fitting garments of persons.

3045. Stanislas Tranquile Modeste Sorel, of Paris, France, civil engineer. Certain improved compositions to be employed as substitutes for caoutchouc, gutta percha, and certain fatty bodies.

Dated January 2, 1854.

1. Charles Hustings Collette, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the manufacture of sugar. A communication.

3. Alfred Dawson, of Barnes-place, Stepney, Middlesex. Converting small coal or coal-dust, or small coal and coke into solid blocks of fuel.

5. Pierre Ambroise Montel, engineer, of Paris, France. Certain improvements in stopping the trains on railways.

7. Peter Armand Lecomte de Fontainemoreau, of South-street, London. Certain improvements in water-wheels. A communication.

Dated January 3, 1854.

9. Joseph Madeley, of Walsall, Stafford, machinist. An improvement or improvements in the manufacture of certain kinds of tubes, and in nuts for the heads of screws.

11. James Strovold, of Barnes, Surrey, civil engineer. Improvements in machinery or apparatus for sifting and washing gravel or other similar substances.

13. Edward John Willson, of Oxford-street, Middlesex, naturalist. An improved method of making portfolios, music-books, brief-cases, and pocket-books.

15. John Isaiah Grylls, of Murton-street, Sunderland. An improvement in whelps for the barrels of capstans, windlasses, and other machinery.

Dated January 4, 1854.

19. David Hulett, of High Holborn. Improvements in gas regulators for regulating the supply of gas to the burner. Partly a communication.

Dated January 5, 1854.

21. Joseph Liddiard, of Deptford, Kent, architect and surveyor. Improvements in the construction of furnaces, with a view to the prevention of smoke.

23. David Blair White, of Newcastle-upon-Tyne, doctor of medicine. Improvements in the manufacture of waterproof fabrics, and of waterproof bags, and other like articles.

25. William Rigby, of Glasgow. Improvements in steam hammers and pile-driving machinery.

Dated January 6, 1854.

29. Isaac Pearse, of Cawsand, Cornwall, pilot. Improvements in means for navigating ships or other vessels.

30. Henry Hind Edwards, of Ludgate-hill, London, civil engineer. Certain improvements in treating peat and vegetable matters for the purpose of fuel, as well as in the extraction of other useful products therefrom. Partly a communication.

31. Robert Tait, of Glasgow, Lanark, North Britain, merchant. Improvements in the manufacture or production of ornamental fabrics.

32. John Radcliffe, of Stockport, Chester, machinist. Certain improvements in power looms for weaving.

33. John Healey, of Bolton-le-Moors, Lancaster,

engineer. Improvements in spinning-machines known as mules, and in machines of similar character. A communication from Adolphe Peynaud and Edmond Peynaud, manufacturers, of Charleval, France.

34. Moses Poole, of Avenue-road, Regent's-park, Middlesex. Improvements in the manufacture of dextrine, glucose, and alcohol, and in employing the products of such manufacture. A communication.

35. John Davie Morries Stirling, of the Larches, Aston, near Birmingham, Warwick, Esq. Improvements in the manufacture of iron.

36. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in the construction of motive power engines, part of which improvements is also applicable to the packing of pistons generally. A communication.

Dated January 7, 1854.

38. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improved machinery for dyeing, washing, and bleaching fabrics. A communication.

42. Nicholas Michael Caralli, of Glasgow, Lanark, merchant. Improvements in the manufacture or production of ornamental fabrics.

44. Henry Sutherland Edwards, of Paris, France, gentleman. Improvements in preparing textile fabrics or materials for the purpose of their better retaining colours applied to them. A communication.

Dated January 9, 1854.

46. Zachariah Pettitt, of Fordham, near Colchester. Improvements in thrashing-machines.

48. Richard Husband, of Manchester, Lancaster, hat manufacturer. Certain improvements in the method of ventilating hats or other coverings for the head.

50. Richard Howson, of Manchester, Lancaster, engineer. Certain improvements in screw-propellers.

Dated January 10, 1854.

52. Edward Tyer, of Rhodes-terrace, Queen's-road, Dalston, Middlesex, electrical engineer. Improvements in giving signals on railways by electricity, and in instruments and apparatus connected therewith.

54. Antoine Marie Edouard Boyer, Elie Ducros, and Ossian Verdeau, of Paris, France. Certain improved compounds to be used in dyeing.

56. The Reverend William Renwick Bowditch, of Wakefield, York, clerk, bachelor of arts. Improvements in the purification of gas, and in the application of the materials employed therein.

58. Alexander Mitchell, of Belfast. Improvements in propelling vessels.

60. Adolphe Drevelle, of Halifax, York, merchant, agent for Augustin Morel, of Roubaix, France. A new combing-machine, suitable for any textile or fibrous matter. A communication from Augustin Morel, of Roubaix, France.

Dated January 11, 1854.

62. Ambroise Auguste Masson, of Paris, France, manufacturer. Improvements in the manufacture of thread or wire to be used for making gold or silver lace.

66. William Watt, of Glasgow, Lanark, chemist. Certain improvements in the application of heat to drying purposes.

68. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in extracting gold from the ore. A communication.

70. Marcel Vetillart, of Le Mans, France. Improvements in drying woven fabrics, yarns, and other goods.

72. Felix Tussaud, engineer, of Paris. An universal pump-press, with continuous action, called "continuous producer."

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January 20th*, 1854.)

1916. John Atherton and James Abbott. Certain improvements in and applicable to machines for winding yarn or thread, called winding-machines, used in the manufacture of cotton and other fibrous substances.

1918. George Richardson. Improvements in railway signals, and in the means of preventing accidents upon railways, and in the apparatus connected therewith.

1930. David Chalmers. Improvements in machinery or apparatus for cutting the pile of woven fabrics.

(*From the "London Gazette," January 24th*, 1854.)

1964. William Mann. Improvements in the purification of gas, and in the treatment of the material used in such purification.

1973. Alfred Swonnell. An improved construction of tie for neck-cloths and neck-ribbons, applicable also to neck-ribbons of caps and bonnets.

1979. George Davis. Certain apparatus for distinguishing genuine from counterfeit coin.

1981. Richard Archibald Brooman. Improvements in the treatment of wool and silk, and in machinery for preparing silk so treated. A communication.

2004. John Henry Johnson. Improvements in the preparation and application of gluten. A communication from François Durand, of Toulouse, France.

2022. William Beckett Johnson. Improvements in steam engines, and in apparatus connected therewith.

2031. James Pigott Pritchett the younger. Improvements in window-sashes and shutters.

2043. John Smalley and Washington Smirk. An improvement in railway carriage axles.

2071. Peter Armand Lecomte de Fontainemoreau. Certain improvements in lighting for consuming the carbon escaping combustion in ordinary flames. A communication.

2073. Philip Grant and John Doherty. Improvements in the mode or method of cutting and finishing brass rule and wood reglet used in the art or process of letter-press printing and other similar purposes, and in the machinery or apparatus employed therein.

2139. William Nash. An improved mode of manufacturing china and earthenware articles on the lathe.

2154. Henry Meyer. Improvements in looms for weaving.

2196. Samuel Alexander Benetfink. An improved construction of coal-box.

2220. Louis Dominique Girard. Certain improvements in hydraulic engines.

2228. Michel Ovide Bernard Lesage. Certain improvements in hydraulic engines.

2286. Alfred Ely Hargrove and Ralph Richardson. Improvements in machinery or apparatus for printing.

2500. James Nasmyth. Improvements in the pistons and piston-rods of steam-hammers and pile-drivers, and in the parts in immediate connection therewith.

2535. Frederick Albert Gatty. An improved bath for heating and distilling.

2602. William Pidding. Improvements in the manufacture of fabrics made of silk, cotton, wool, flax, hemp, straw, grasses, fibres, mohair, and other hair, spun glass, and enamelled, glazed, or plain wire, and in the application of some of these materials, and also in the machinery or apparatus connected with such manufacture.

2616. Henry Kilshaw and Richard Hacking. Certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.
2634. Henry Kilshaw and Richard Hacking. Improvements in machinery or apparatus to be employed in the preparation of cotton and other fibrous substances for spinning.
2671. Robert Griffiths. Improvements in propelling vessels.
2712. Robert Adams. Improvements in fire-arms.
2858. Jean Baptiste Edouard Ruttre. Improvements in machines for producing shoddy from woven fabrics, and for sorting the fibres of fibrous materials.
2877. William Muir. Improvements in machinery and apparatus for cutting out parts of garments.
2895. Philip Grant. Improvements in printing presses.
2936. Robert William Waithman. Improvements in belts or bands for driving machinery for use in mines and for other purposes.
2937. Joseph Sharp Bailey. Improvements in machinery for operating upon wool, alpaca, mohair, and other fibrous materials, preparatory and prior to being spun.
2938. Joshua Horton. Improvements in the manufacture of certain kinds of metallic vessels.
2947. Henry Milward. New or improved machinery for manufacturing needles and fish-hooks. A communication.
2969. Thomas Vincent Lee. Improvements in the construction of certain machinery and apparatus for the manufacture of bricks and tiles.
2977. Charles Lewis. An improved lamp for signalling.
2997. Frederick Crace Calvert. Improvements in the treatment of naphthas and other volatile hydrocarbons, and in the application of the same to various useful purposes. A communication.
3007. Richard Green. Improvements in insulators for insulating the wires or rods employed for conducting or transmitting electricity.
3026. Henri Catherine Camille de Ruolz and Anselm de Fontenay. An improved metallic alloy.
3033. John Pym. Improvements in machinery for grinding auriferous and other ores, and separating the metal therefrom.
3041. Adolphus Oppenheimer. Certain improvements in the manufacture of silk velvet and other such piled goods or fabrics.
1. Charles Hustings Collette. Improvements in the manufacture of sugar. A communication.
10. David Kennedy. An invention for the use of tanners, being certain compositions of matter to be used in the manufacture of leather.
19. David Hulett. Improvements in gas regulators for regulating the supply of gas to the burner. Partly a communication.
22. Edward Schischkar and Frederick Crace Calvert. Improvements in dyeing and printing textile fabrics and yarns.
25. William Rigby. Improvements in steam-hammers and pile-driving machinery.
35. John Davie Morries Stirling. Improvements in the manufacture of iron.
36. Alfred Vincent Newton. Improvements in the construction of motive-power engines, part of which improvements is also applicable to the packing of pistons generally. A communication.
54. Antoine Marie Edouard Boyer, Elie Ducros, and Ossian Verdeau. Certain improved compounds to be used in dyeing.
56. The Reverend William Renwick Bowditch. Improvements in the purification of gas, and in the application of the materials employed therein.
70. Marcel Vetillart. Improvements in drying woven fabrics, yarns, and other goods.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed January 20, 1854.

1729. James Murdoch.
2025. Richard Archibald Brooman.
2437. Samuel Lloyd the younger.
2549. John Moffat.
2687. Richard Stuart Norris and Ebenezer Talbott.

Sealed January 21, 1854.

1723. John Lilley.
1724. William Birkett.
1725. Simon Charles Mayer.
1728. Edward Cockey, Henry Cockey, and Francis Christopher Cockey.
1732. John Gillam.

Sealed January 23, 1854.

1739. John Hall.
1741. Samuel Barlow, junior, and John Pendlebury.
1744. Alexander Clark.
1898. George Peel and Robert Brownhill.
1963. John Whiteley.
1989. James Hill.
2171. Charles Collins.
2423. John France.

Sealed January 25, 1854.

1778. William Wild.
1794. Samuel C. Lister.
1822. George Armitage.
1846. Richard Christy and John Knowles.
1862. Thomas Mac Sweny.
1894. Robert Smith Bartleet.
2272. Alexander Turiff.
2328. John Colin Sharp.
2622. Stephen Barker.
2644. John Liddell.
2648. Joseph Fry.
2718. Francis Arding.
2740. Daniel Lancaster Banks.
2742. Davidson Nichol.
2808. George Collier.
2810. Samuel C. Lister.
2812. Jonathan Saunders.
2838. John Hargrave.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

S. S.—The thickest leather is formed of that portion of the ox-hide which is called the *butt* or *back*, and is that commonly used for harness and saddlery, hoses, belts, and soles for boots and shoes. The use of buff-leather is now almost wholly confined to the manufacture of army-belts; it is at present formed from the hides of cows, and is very thick and pliant. You are perfectly correct in your conjecture about the hides of horses, which are tanned and curried, and employed in harness-work, &c.

J. T., Salisbury.—Peake's life-boat was designed by the inventor from suggestions taken from a variety of others which were constructed to compete for the premium offered by the Duke of Northumberland. It was intended to combine the good qualities of all the others, although Richardson's is preferred to it by many.

Inventor, Goswell street.—The Lancashire sewing-machine may be seen at a shop in Holborn very close to the end of Fetter-lane. The cost of one is about £30.

C. J. Symons.—Your reply was duly received.

A. M.—We are not aware that the method of communication between the driver and the guard which you describe has ever been patented; we do not think it has.

J. C. W.—As your former communication was received so long ago, we cannot answer your question; it is not likely, however, that your invention was identical with the one you mention.

S. T., Cambridge.—We should be obliged if you would favour us with your address, as we wish to communicate with you upon the subject of your letter.

John Laidler and *H. Y.* will be replied to in our next.

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Mechanics' Magazine.

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Edited by R. A. Brooman, 166, Fleet-street.

QUAIFE'S PATENT WATCH-MAKING MACHINERY.

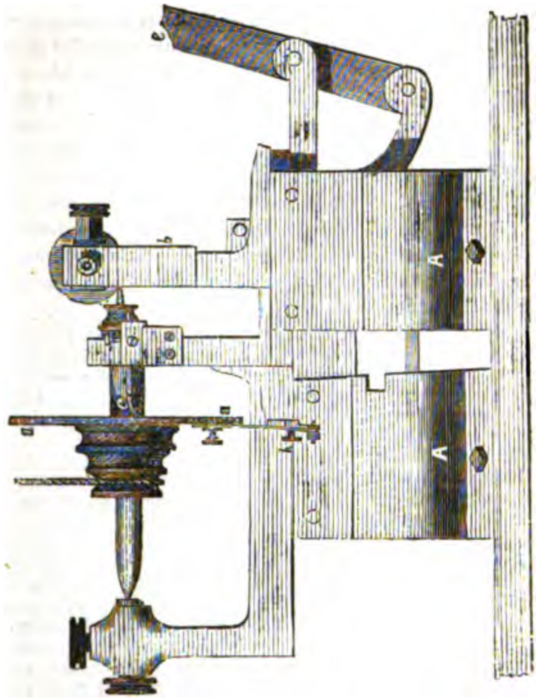


Fig 9.

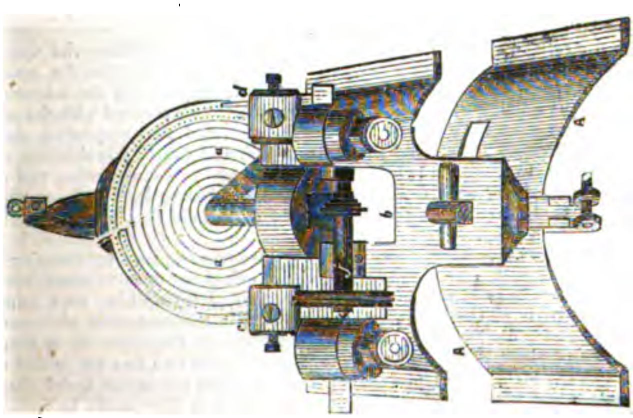


Fig. 8.

QUAIFE'S PATENT WATCH-MAKING MACHINERY.

WATCH-MAKING is one of those manufactures in which the price of labour has hitherto formed a large element of the entire cost of the production. While Horologists have from time to time done so much towards perfecting the construction of watches by successive improvements in escapements and compensations, the makers of these instruments have been still restricted to comparatively tedious and expensive processes. Mr. Quaife, the inventor of the apparatus we are about to describe, is a practical watch-maker, and by applying himself for a series of years to the subject, has succeeded in producing an entirely new system of machinery, by which the cost of the manual labour expended upon the movement-making and finishing departments will be reduced to about one-fourth of its previous amount. The most characteristic feature of the invention is the use of hollow mandrils, and it is by this that the saving is chiefly effected. We have had watches constructed by Mr. Quaife's machinery submitted to our inspection, with the details of the cost of their construction, and have thus been able to verify the success of the invention.

Beside the adaptation of machinery to the manufacture of watch-cases and movements, Mr. Quaife's invention embraces an improved movement or movements for watches. We shall, however, for the present confine ourselves solely to the movement-making department, leaving the remainder for a subsequent article.

In carrying this part of his invention into effect, Mr. Quaife forms the plate at the back of the dial by stamping and pressure, with the requisite number of bearings for the wheels and movements sunk at one operation, and also forms the opposite or top plate in like manner, with the necessary parts countersunk or pierced. He also employs the like operation of stamping and pressure for producing the wheels, and such other parts of the movements of watches as are capable of being thus formed in dies.

Figs. 1 and 2 are face views of a pair of dies for striking the pillar-plate of the movement. Fig. 1 shows the upper die, which has on its face a raised table, *a*, which forms the hollow back of the plate, and three pins, *b*, *c*, *d*, which punch the pillar-holes. It has also a point in the centre to mark the centre wheel-hole, *e*, and three points to mark the holes for the dial-feet, *f*, *g*, *h*. *i* is a sunk part for enabling the "bar" to be struck up. This part is formed with four points in it, for the purpose of chamfering and marking the third, fourth, and scape-wheel holes, *k*, *l*, *m*, and the balance-hole, *n*, to the correct depth. It is also provided with points to mark the barrel-arbor hole, *o*, the ratchet stop-screw hole, *p*, the bolt-screw hole, *s*, the bolt spring-screw hole, *t*, and every other hole that is required in the plate. Fig. 2 shows the under die, which is formed with counterparts to fit and correspond to those of the upper die, fig. 1. It has three holes to receive the pins, *b*, *c*, *d*, three points, *w*, *x*, *y*, to form the three holes for the scape-wheel cock, a raised part, *z*, which strikes the bar into the upper die, and three holes around the die, to allow the punched pieces of metal to escape. These dies are employed in powerful stamping-presses of the ordinary construction.

Figs. 3 and 4 are side and face views of a pair of dies, for striking the upper plate. Fig. 3 represents the upper die, which has three pins, *a*, *b*, *c*, on its face for making the pillar-holes, and a raised part, *d*, for striking out the hole in plate for the balance to work in. Fig. 4 shows the under die, which has four apertures to correspond with the pins, *a*, *b*, *c*, and *d*, of the upper die for the pillar and balance-holes, and four projecting points, *e*, *f*, *g*, *h*, to mark the barrel-arbor hole and the centre, third, and fourth wheel-holes, with four other points, *l*, *m*, *n*, *o*, to mark the two steady-pin holes and two screw-holes, and all other required holes of the balance-cock. These dies, like those before described, are used in an ordinary screw-press. There are holes at the side of the die to allow the punched-out pieces of metal to come away.

Fig. 5 is a perspective view of the dies which the inventor employs for crossing out the wheels from the blank pieces of metal, previously punched out of hard sheet-brass to the proper size, and with a hole in the centre. *a*, *b* are two plates working on a joint, *c*, and having the female parts of the dies, *d*, *d*, in each, exactly corresponding with each other. The centre of the under die has a pin projecting from it, and the upper die is formed with a hole to receive this pin. When a wheel is to be struck, the two dies are turned down on the block, *e*, with the blank-wheel placed between them, the pin in the under die passing through the hole in the wheel; and the die-punch, *f*, fig. 6, is then made to pass through them by means of a screw or other press. Fig. 7 is a face-view of the die, *f*, which has an

aperture up the centre, and five radial cuts from the centre to the outside, which allow the parts, *d*, *d*, to pass upwards as the punch is forced through the blank. This operation produces the blank-wheels ready for having the teeth cut. The waste pieces are carried on to the block, *e*, and are removed by lifting up the dies, *a*, *b*. *h* is a screw which holds the apparatus down to the bottom of the press, and upon which it is turned beneath and away from under the press, to allow the work to be placed in and taken out when required. The size of the dies in this apparatus may be varied according to the dimensions of the wheels to be produced.

The inventor also employs a lathe for turning the pinions of watch-movements, in which is a hollow mandril, which is kept up to a collar by a sliding head-stock, which, when placed in position, is fastened by two screws; the hollow mandril has a taper-screw cut on

Fig. 1.

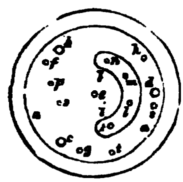


Fig. 2.

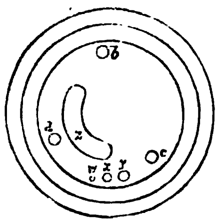


Fig. 3.

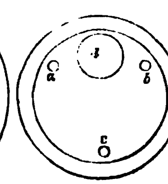
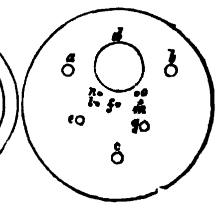


Fig. 4.



the working end, and this end is slit through as far as the collar, to allow a taper-nut to screw it tight on a pinion-wire, which is held in the hollow mandril; the nut has a notch, in which a drop-lever is held by the finger for the purpose of screwing and unscrewing when the pinion-wire requires to be brought forward as the work is done. In this machine the pinions are roughed out from the wire, and some of the commoner ones finished. The machine may be made of different sizes, according to the peculiar character of the work required to be done.

He also uses a lathe for turning the screws and pillars of watch-movements. The peculiarity of this machine consists in the employment of a hollow mandril and fixed tools working on a simple kind of slide-rest. The wire for making the screws or pillars passes through the hollow mandril, and is secured in it by a screw-nut. There is also a fixed knife or tool, having formed on it the pattern required to produce the desired work, and another knife, which cuts off the finished work. Both these tools are screwed to the slide-rest. The screw is formed (while the mandril is running) by means of the handle-piece, which has a small screw-die at its end, for cutting the thread on the screw-blank, and is passed up a dovetail slot between the knives, so as to come to its work. The screw thus formed is then cut off by one of the knives. This machine may be made of various sizes, to suit the diameter and pitch of the screws to be formed; it may also be furnished with tools of different patterns for performing work of different descriptions.

The pinions are finished, and the pivots turned also by a machine. There is a bar upon which two rests slide, one on each side of the lathe, so as to bring their points into the hollow of each end of a short mandril, which is formed in two parts, each part having half the central aperture in it. The upper half of the mandril lifts up, and is screwed down on the pinion when placed in the mandril by a screw sunk in the edge of a pulley. The mandril is only just the length of the head of the pinion to be turned, so that both arbors and pivots of the pinion can be finished before taking it out. The mandril and pulley are held between two side pieces of steel, brought tight up against the mandril ends by two screws, and made fast on the bar by screws. A circular metal-polisher fits into the socket of the rest, and is made tight by two thumb-nuts. It is turned by a bow on the pulley, and by revolving in contact with the pinions produces a fine polish on them. The size of the parts of this machine may be varied to suit different sized pinions.

Figs. 8 and 9 are respectively a front and side view of a wheel-cutting engine for cutting out the teeth of wheels employed in watch movements. The principal feature of this engine is the mode or arrangement by which it advances the work step by step, without the assistance of the hand to shift the plate by means of the forward motion of the cutter frame. A A, is the general framework of the engine. *a* is a circular plate or disc attached to the mandril which carries the wheels to be cut. This plate has formed in it a series of concentric circles of perforated holes, the number of perforations in each circle

being either equal to the number of teeth required to be cut, or such other number as is divisible into the required number of teeth. The perforations are of such size, and set so closely together, as to make the intervening solid parts between the perforations of little thickness. *c, d*, are two wires, which are attached to the cutter-frame exactly opposite each other, and work in the holes of either of the circles; one of those wires, *c*, has a jointed point, and an interior spring for throwing the point down, and is longer than the opposite wire, *d*, by the length of the joint. Behind the plate, *a*, is attached to the framing, A, a

Fig. 5.

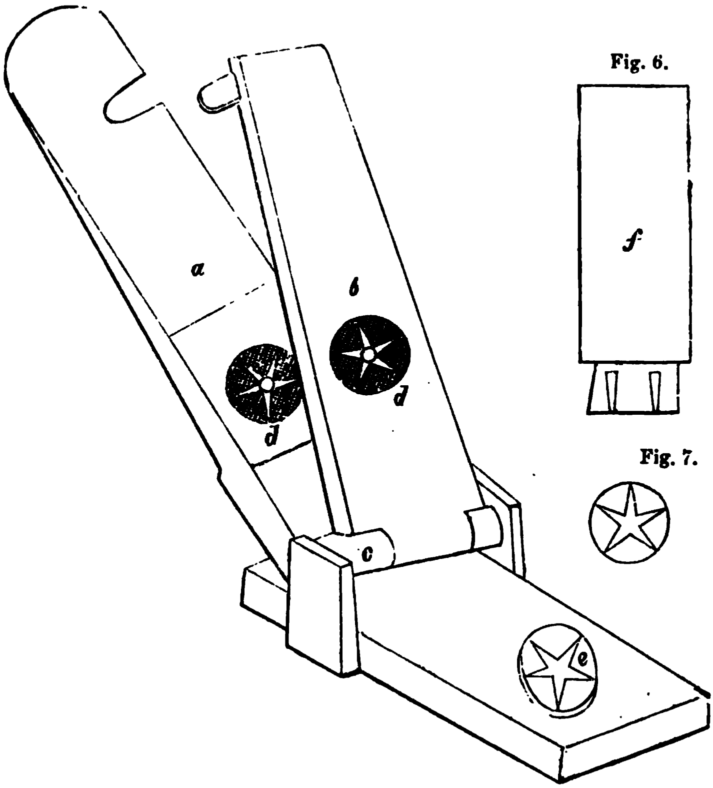


Fig. 6.

Fig. 7.

spring with two screws, *h, i*, to adjust it to the proper length to fall into the holes of the circle in which the wires are set to work, and so prevent the plate from turning back. The cutter, *j*, by which the cutting of the teeth is effected, is mounted in the cutter-frame, *b*, and is driven at the required speed by the fly-wheel, *f*. The wheels to be cut are screwed upon the end of the mindril, *g*; and as soon as one tooth has been cut, the cutter-frame, *b*, is drawn back, so as to release the wires, *c, d*, and is then slid forward by the lever, *e*, when the jointed wire, *c*, enters the next hole below that which it had previously occupied, and turns the plate one hole forward by the action of the sloped point against the sides of the hole; the plain pointed wire, *d*, on the opposite side of the cutter-frame, then enters the next hole to that which it had before occupied, and thus holds the plate firmly while the cutter goes through the wheels. By this arrangement a great saving of time is effected, and six or eight wheels may be cut together, which can be turned on the engine, using the hand-wheel, *p*.

The inventor employs a pair of dies for striking out the balance-cock complete, with the words "slow" and "fast," and the index at the same time. The upper die has a raised

part to form the cock, on which is another raised part of greater height, which cuts the piece out of the centre of the cock. The former raised part cuts the cock out of the sheet with the aid of an additional die, which is a round flat plate, about a quarter of an inch thick, having a hole which fits over the upper raised part of the bottom die. The upper die carries the piece which it has cut out down through the additional die on to the lower die, and forces it out through the centre, at the same time striking the words "slow" and "fast," and the index, and marking the screw-holes and steady pin-holes required to fit the balance-cock on to the plate.

ASCENSION IN BALLOONS.

To the Editor of the Mechanics' Magazine.

SIR,—I hope that a more than usual amount of vanity will not be ascribed to me. It may be thought that I have a desire of monopolizing your scientific correspondence. I can *say* nothing to oppose such an opinion. I will *do* all I can. I will be brief. I wish to make a few remarks *à propos* to the letter of "Senex," which appeared in your last Number. He says, "If a key or any small weight be tied to the end of a cord which is held in the hand, and if a rapid circular motion be given to the key by the movement of the hand, the key will ascend, in describing a large circular path, and will ultimately revolve on the same level with the hand that holds the cord." And putting the car of a balloon in the place of the hand, he says, "It is not easy to think that a weight describing a circular path on the same level with the bottom of the car, could have the same effect on the balloon as if it were to hang vertically." Certainly not. *If* the weight move in a horizontal plane passing through the point where the end of the cord is fixed, there will be no part of the tension of the string effective in a vertical direction. The fallacy is in supposing that the weight would *ever* move in a horizontal plane; for it assuredly *never* would. I assume that "Senex" imagines, not that there is any magical influence developed by the motion of a weight in a circle which can *destroy* the power of terrestrial attraction, but that the centrifugal force counteracts the force of gravity. Now, that a force, A, may be counteracted wholly or partly by another, B, it is necessary that the force, B, act wholly or in part in a direction opposite to that of A. When the directions of A and B are perpendicular to one another, they certainly no more oppose than they assist each other. *That*, I think, is clear. Now, if we suppose, as we may for our present purpose, that gravity acts in parallel lines perpendicular to the horizon, then the force of gravity will act in a direction uniformly perpendicular to the plane in which the direction of the centrifugal force always lies. And, therefore, the centrifugal force will in no way counteract its effect. Then the resolved part of the tension of the string downwards must equal the weight of the body; if T be this tension, and θ the angle made by the cord with the horizontal plane, and W the weight:

$$T \sin\theta = W.$$

As we increase the velocity of the weight, the angle, θ, becomes less; but then the tension of the string, T, becomes greater in such a way that its tendency to pull the balloon downwards remains constant.

The solution of the following equations will determine all the circumstances of such motion when the velocity is v, and length of string l:

$$T \sin\theta = W \quad . \quad . \quad . \quad . \quad (\mathrm{I.})$$

$$T \cos\theta = \frac{W}{g}\,\frac{v^2}{l\cos\theta} \quad . \quad (\mathrm{II.})$$

Dividing

$$\tan\theta = \frac{g\,l}{v^2}\cos\theta$$

$$\sin\theta = \frac{g\,l}{v^2}(1-\sin^2\theta)$$

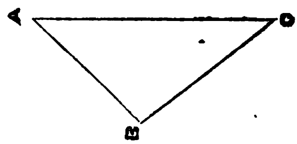
$$\sin^2\theta + \frac{v^2}{g\,l}\sin\theta = 1$$

$$\therefore \sin\theta = -\frac{v^2}{2\,g\,l} + \sqrt{1+\frac{v^4}{4\,g^2\,l^2}} = \frac{1}{2\,g\,l}\left(\sqrt{4\,g^2\,l^2+v^4}-v^2\right)$$

$$T = \frac{W}{\sin\theta} = W.\,2\,g\,l\,\frac{1}{\sqrt{4\,g^2\,l^2+v^4}-v^2} = \frac{W}{2\,g\,l}\left(\sqrt{4\,g^2\,l^2+v^4}+v^2\right)$$

These equations and arguments hold true, only so long as we are able to treat the ratio of the length, l, to the radius of the earth as inconsiderable. If, however, the length of the cord be some hundreds of miles, our problem assumes a different aspect. The centrifugal force would then counteract in part the effect of gravity.

Let A be the point of suspension. B, a position of the body. C, the centre of the earth.



AB$=l$. AC$=r$. BAC$=\theta$. ACB$=\phi$, and the rest remain as before. Then

$$T \cos\theta = W.\cos\phi \quad . \; . \; . \; . \; . \; . \; . \; . \quad (I.)$$

$$T \sin\theta + W \sin\phi = \frac{W}{g} \quad \frac{v^2}{l \sin\theta} \quad . \; . \; . \quad (II.)$$

$$\frac{r}{\sin} = (\theta+\phi, \frac{l}{\sin\phi} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad (III.)$$

From (I.) and (II.) we get

$$\sin\theta.\cos\phi + \cos\theta\sin\phi = \frac{v^2}{g\,l}\cot\theta \quad . \; . \; . \quad (A)$$

$$\sin(\theta+\phi) = \frac{v^2}{g\,l}\cot\theta = \frac{r\sin\phi}{l} \quad . \; . \; . \; . \quad (B)$$

Combining (A) and (B), we get this $=^{n}$ in cos 0

$$\left(1+\frac{2\,v^4}{v^2\,g^2}\right)\cos^4\theta + \frac{2\,v^4}{g^2\,lr}.\cos^3\theta - \left(2+\frac{v^4}{v^2 g^2}\right)\cos^2\theta + 1 = 0$$

which may be solved better for a particular case than generally.

For any given values of l, r, and v, real values of θ, ϕ, and T, may be found. This case is, of course, the general solution of the problem. And the influence of the motion on gravity is to diminish its effect by the quantity, W $(1-\cos\phi)$, which in all common cases is so inconceivably small as to make it impossible to measure it.

To make an experiment to obtain the effect of such a movement on a balloon would, I think, be superfluous. We can predict it with sufficient certainty.

I am, Sir, yours, &c., J. C.

Deptford, Jan. 30, 1854.

RAILWAY BREAK.

To the Editor of the Mechanics' Magazine.

SIR,—I am not in a position to offer a decided opinion upon the merits of the break for railway carriages, described in your last number, by Mr. Henry; but I beg to suggest what I conceive would be an improvement upon it. It is evident that the strain brought upon the blocks would, in Mr. Henry's arrangement, act across the arms, and therefore, I imagine, carry them away when the screw was considerably tightened. Now it appears to me that if the arms, instead of being vertical, were very much inclined, so that the blocks should fall in the rear of the point at which the arms are supported, the strain would then be made to act chiefly in the direction of the length of the arms, and a much less destructive action would thus be obtained. I am quite aware that with this alteration an upward force would be brought upon the middle rail; but this would be very easily resisted by placing additional fastenings in the rail and sleepers. I suppose the necessity of laying down a third line of rail would be a strong objection to the principle of the break in both the forms suggested; but it should be remembered that while contingent expenses would thus be greater than those connected with the breaks at present in use, the cost of the break itself would be very much less than that of the latter.

London, Feb. 1. SUBSCRIBER.

DRAINAGE—AN INCLINED PLANE FOR CANALS.

At the sitting of the Institution of Civil Engineers, held on January 24, on the reading of the abstract of the proceedings of the last meeting, regret was expressed, that any remarks on the experiments published in the Blue Books emanating from the Board of Health, should have, apparently, been considered to have a personal application; nothing could have been more opposed to the intentions of the speakers, and they were convinced, that if the authors of the Blue Books had consulted the engineer alluded to, the necessity for making the remarks would not have existed.

This view was confirmed by the published results of an experiment, on a large scale, made under the direction of an engineer of the Board, so recently as December 16th, 1853, at Alnwick. The line of earthenware pipe was 770 yards long, 18 inches in diameter, and lying at an inclination of 1 in 400, with a square culvert, 20 inches by 20 inches, leading from a flushing chamber and stop-gate, adjoining the weir from the river.

In the first experiment the sluice was only sufficiently elevated to fill the pipe, when the results were:

Velocity, 3·581 feet per second, or 2·441 miles per hour.

Discharge, 2,367·78 gallons per minute, or 3,409,603 gallons per day of 24 hours.

Depth at delivery end, 12½ inches.

In the second experiment the sluice was entirely taken out, causing the water to accumulate to a depth of 13 inches above the top of the pipe; when the results were:

Velocity, 3·915 feet per second, or 2·67 miles per hour.

Discharge, 2,588·04 gallons per minute, or 3,726,777 gallons per day of 24 hours.

Depth at delivery end, 15 inches.

The second experiment gave the most decided results; the water being 13 inches above the top of the upper end of the pipe, and 3 inches below at the lower end; allowing for the hydraulic height due to the velocity, a working inclination was given of about 1 in 340, and assuming, in accordance with the received rules, the resistance to be as the square of the velocity, and, as a corollary, *cæteris paribus*, the velocity in pipes being as the square root of the mean hydraulic height; *i. e.*, as the square root of the diameter of circular pipes,—the velocity stated being about 235 feet per minute, and the real inclination being about 1 in 340, would, with these data, give for a pipe 6 inches diameter, at an inclination of 1 in 100, a velocity of 255 feet per minute.

According to the Blue Books, the velocity stated from the original experiments of the Board of Health, at an inclination of 1 in 100, would be 325 feet per minute. The results of this experiment, in fact, coincided much nearer with those given by the formula, even as stated in the Blue Book, than with the results of the pretended experiments therein.

For a similar pipe, with an inclination of 1 in 800, the velocity would be 88 feet per minute, instead of 240 feet per minute, the formula giving a velocity of 75 feet per minute.

It was therefore contended, that whilst the recent experiments at Alnwick confirmed the accuracy of the results of the formula, they as clearly demonstrated the inaccuracy of the experiments and the erroneous deductions stated in the Blue Book, which could not therefore be received as authority.

The Paper read was a "Description of an improved Inclined Plane, for conveying Boats to and from different Levels of a Canal," by Mr. J. Leslie, M. Inst. C.E.

After alluding to the successful inclined plane, established by the author, at Blackhill near Glasgow, on the Monkland canal, and describing the difficulties to be overcome, and the points essential for the good working of such lifts, the paper proceeded to propound, as the simplest modification, in cases where there was a scarcity of water, and where vessels would bear being taken out of the water, to have two uniform inclined planes, descending each way, from a culminating point or summit, placed at a suitable elevation above the water in the upper reach. Each of the inclines was cut down for a distance from the summit equal to the length of a carriage, fit to carry the largest boat, and a railway laid on a lower level in a segment of a circle vertically; the segment being traced from a centre so placed, that lines parallel to, and equidistant from, the inclined planes, should each be a tangent to the circle, at a point halfway between their summit or apex, if produced, and the terminations of the segmental rails.

On this curved railway there was a lower, or subsidiary carriage, running on a number of rollers; so as to have no friction on the axles, and having straight rails and ratchets on its upper surface.

When the lower carriage was at either end of the curved railway, its upper surface formed a direct continuation of one of the inclined planes, and being exactly one half of the length of the curved railway, the uppermost point of the rails fixed on the carriage coincided exactly with the apex of the two inclines.

The principal carriage, with a boat on it, was then run forward, so as to stand on the

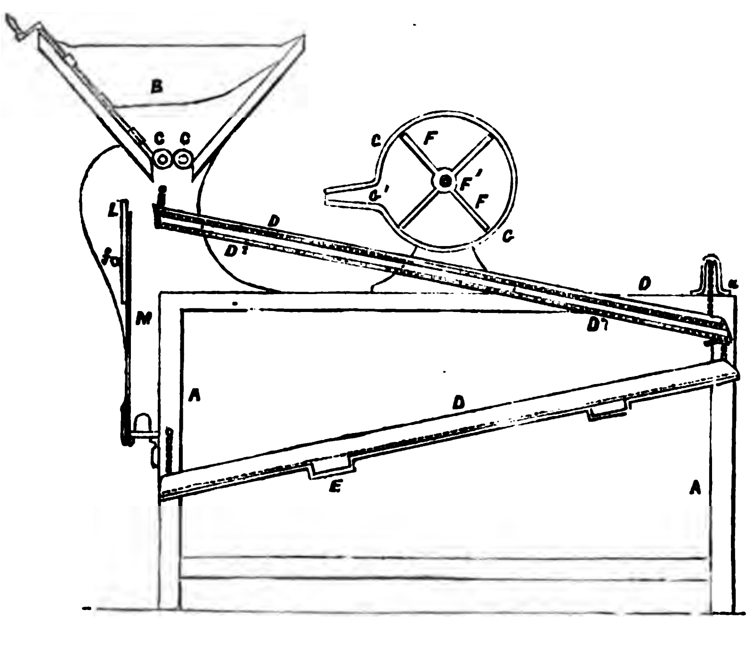
lower carriage, by a rope attached to a drum on the shaft of the fixed engine, and was held in its place by palls dropping into the ratchets, when the lower carriage, with the travelling carriage and the boat on it, was moved forward by a wheel working in a rack under the lower carriage, which was thus made to traverse the apex or summit, and descended until the surface of the rails in the lower carriage, and on the incline, became identical, and the upper carriage was lowered into the water by the rope motion, and the boat was allowed to float from it into the next reach of the canal.

This plan was first proposed for removing vessels from a small dock by the side of the Vistula, at Warsaw, so as to be out of the reach of floods and of ice, and whenever there was a scarcity of water for lockage, or for working caisson inclined planes, it was admitted to be a desirable modification.

In the discussion, after paying a just tribute to the ingenuity and skill of the author, it was admitted that inclines of this nature were only applicable for certain exceptional situations; that in general it would be cheaper to pump up the water for lockage, using over again as it might be required, and that in general the competition between railways and canals had ended in the partial abandonding of the latter, in spite of all attempts to use steam propulsion and traction.

GILLAM'S PATENT SEED-CLEANSER AND SEPARATOR.

Mr. Gillam, of Woodstock, has lately effected improvements in the seed-cleansing and separating machine, registered by him in 1851 under the Designs Registration Act, and described in *Mechanics' Magazine*, Vol. LV., page 513. The nature of these improvements will be seen from the following description and engraving.



The accompanying engraving represents a longitudinal section of a machine constructed according to Mr. Gillam's invention. A A is the framework and B the

hopper, C C are the feed rollers, which are placed at the lower portion of the hopper, and caused to revolve in opposite directions. D D^1 are the sieves, each of which is composed of perforated zinc or woven wire, and divided into different degrees of fineness. D^2 is an additional sieve, placed beneath the sieve D, and formed of a similar perforated material, but of a finer mesh. E E are spouts in connection with the sieves, D, D^1, D^2, from the mouths of which the different varieties of seed are collected. The sieves, D D^1, are suspended from the framework, and in the inclined position shown, by means of the link or chains, *a a*. The inventor also employs connecting rods, one end of each of which is attached to a pin or centre upon the side of the sieves, D D^1, while the other ends are connected to a double crank, which is caused to revolve by means of the winch-handle, *d*, the action of which communicates to the sieves a to-and-fro movement, and thereby facilitates the passage of the seeds from end to end of the sieves. For giving to the sieves a jogging or transverse motion, combined with the to and fro movement, springs are attached to the framework, and project therefrom at opposite corners of the sieves, so that as they are caused to move to and fro, they alternately come in contact with the springs, which impart the jogging or transverse motion. F is a fan-blower, revolving upon the spindle, F^1, and within the case G, the front of which has an opening or mouth, G^1. The spindle of the fan is driven by a cord pulley through the intervention of a second pulley and toothed wheel, I, which has motion imparted to it by a winch handle.

The purpose of this fan is for causing, by its rapid revolution, a stream of air to be passed through the seed as it falls from the feed-rollers on to the first sieve, and thereby to winnow or cleanse it from any dust or impurities that may be mixed with it, such lighter particles being carried over the back-board, L, and received into a box or other convenient receptacle, while the lighter seeds fall down between the back-board, L, and the framework, from whence they pass down the shoot, M, and are received at the bottom. This back-board, L, is capable of being adjusted to any required height by the pinching-screw, *f*. When it is desired to cleanse and separate such seeds as have a husk, similar to lentils, clover, &c., the inventor employs a circular brush, which may be formed of either bristles, wire, or other suitable material. This brush is caused to revolve within the circular portion of the hopper, which is made of iron or steel, the inner surface of which is roughened, so that the husk is broken by the action of the brush. This brush and hopper occupy the position of the ordinary hopper and feed-roller, as represented in the engraving, when it is required to make use of them for cleansing and separating the seeds for which this particular arrangement is adapted.

PATENT LAW CASES.

TILLIE AND HENDERSON'S PATENT.

(Before the Lord-Chancellor, Jan. 20, 1854.)

THIS was a petition for the sealing of letters patent for an invention of "Improvements in printing shirting fabrics," for which the petitioners had obtained provisional protection 25th April, 1853.

MR. BAGGALLAY for the petitioners applied to the Court for time to answer the affidavits in opposition, the last of which was filed on Tuesday last, and he had not had time to file affidavits in reply.

MR. HINDMARCH submitted that the petitioner was too late, not being within the time limited by the statute 16 and 17 Vic. cap. 115, sec. 6, by which it is provided that "when Letters Patent have not been sealed during the continuance of the Provisional Protection on which the same is granted, provided the delay in such sealing has arisen from accident, and not from the neglect or wilful default of the applicant, it shall be lawful for the Lord-Chancellor, if he shall think fit, to seal such Letters Patent at any time after the expiration of such Provisional Protection," &c.; and after a similar provision with respect to the filing of Specifications, it is in a proviso declared, "that except in any case that may have arisen before the passing of this Act, it shall not be lawful for the Lord-Chancellor to extend the term for the sealing of any Letters Patent, or for the filing of any Specification, beyond the period of one month."

LORD-CHANCELLOR: That does not apply when the delay was caused by a caveat.

MR. HINDMARCH: Protection was granted April, 1853. Nothing was done until 9th September; when the notice of intention to proceed was given on the 17th October, the warrant of the Solicitor-General for a patent was obtained, and on the 19th October application was made for the sealing of the patent. This is a case, therefore, which has arisen since the passing of the Act, which received the royal assent on the 20th August, 1853.

LORD-CHANCELLOR: I do not think this is a case which arose before the passing of the Act.

MR. BAGGALLAY: Our application was clearly made within the six months provisional protection. The 15 and 16 Vic. cap. 83, sec. 20, gives the Lord-Chancellor power to extend the time for sealing letters

patent for such time as the Lord-Chancellor shall direct; the 6th section of the 16 and 17 Vic. cap. 115, limits that to one month; and I admit that if this be a case which has arisen since the passing of the latter Act, that the proviso would apply; but this is a case which had arisen before that Act came into operation.

Lord Chancellor: Your argument is, that if the Act 16 and 17 Vic., cap. 115, had not passed, your application would have been quite in time; were you stayed during the six months provisional protection by a caveat?

Mr. Baggallay: We were.

Lord Chancellor: Then how can it be said that the 16 and 17 Vic., cap. 115, sec. 6, applies to this case?

Mr. Hindmarch: The proviso in the 6th section of the 16 and 17 Vic. cap. 115, overrides the 20th section of the 15 and 16 Vic., cap. 83. The latter Act is clearly recited in the former, which was passed to amend its provisions, and the words, "the sealing of any letters patent," the proviso to section 6 of the more recent Act, are sufficiently large to make it apply to this case.

Lord Chancellor: I do not think that the proviso in the 6th section does override the 20th section of the old Act; it was merely intended to apply to such cases as come within the section itself. The proviso, therefore, does not apply when the petitioner has applied during the provisional protection, and the delay in the sealing has been caused by a caveat entered by a party opposing it. At the same time I must say here publicly, that I cannot allow the extension of the time for sealing a patent or filing a specification in any case, except when the delay has arisen from accident and not from the neglect of the party applying. The indulgence of extending the time was only intended to apply to such cases when some accident happens, such as a snow-storm, which occasions an inevitable delay. Parties may fairly claim from the Court an extension of the time; but when their own negligence, or that of their agents, is the chief cause of the delay, the time cannot be extended.

The petition was then ordered to stand over to the first petition day after Term, to afford the petitioner time to answer the respondent's affidavits.

WILLIAMS' FELT-CLOTH PATENT.—PRIVY COUNCIL, FEB. 1st, 1854.

(Before Lord Justice Knight Bruce, Lord Justice Turner, Sir John Dodson, and Sir Edward Ryan.)

This was a petition for a prolongation of the term of Letters Patent granted to Thomas Robinson Williams, of Cheapside, deceased, for "Improvements in the manufacture of woollen and other fabrics, or fabrics of which wool or fur form a principal component part, and in the machinery employed for effecting that object," bearing date for England the 14th Feb., 1840, for Scotland the 11th April, 1840, and for Ireland the 16th May, 1840.

Mr. Webster appeared in support of the application. No opposition was offered, but the Attorney-General attended to watch the case for the Crown.

The grounds on which an extension was sought were, the large expenditure upon machinery and buildings, immediately after the patent was granted, rendered necessary by the fact that the invention related to a totally new art and manufacture; and also the great expense in forcing such a new manufacture, namely, the felted-cloth, into the market in competition with the goods already in possession of the market. The returns from the license, though once considerable, fell short of the expenditure.

Under these circumstances their Lordships recommended an extension of the Patent right for five years.

SUCTION-PIPE AIR-CHAMBERS.

To the Editor of the Mechanics' Magazine.

Sir,—Seeing in your Magazine communications respecting air-vessels attached to the suction-pipes of pumps, I beg to inform you that it has been my practise to apply them for years. About fourteen years since I was engaged to erect machinery for Messrs. Blundell and Spence, Wandsworth; amongst other matters, a plunger-pump, with suitable and very long suction-pipes. After the pump had been at work some time, I was required to supply in the place of it another, of more than double its capabilities, although the pump had at that time its speed increased so much, that the proper quantity of water indicated by the size of the barrel and the length of the stroke, would not follow through the pipe. This was made evident also by the great jarring which took place when the water met the ram. The pipe, however, had by this time become covered with plant, &c., which it would have been most inconvenient to remove. I accordingly put to myself the following query; viz., would not the existing suction be sufficient to supply a pump double the size of the former, and worked with the same increased velocity? and I concluded that if I could keep up a continuous stream through the pipe, it would be. I then adopted the following successful plan: I placed a vessel, of about five times the contents of the barrel, about two feet

six inches above it, and thus allowed the water to descend by its own gravity into the pump. When this was done, I found that the water came freely into the top of the receiver, and played in one continuous stream. I may further state, that had I then known as much about air-chambers as I have since learnt, I should, in the case referred to, have applied a much larger pump. Some time since, in my own factory, I had a pump at work, with a small square of glass before the jet, and observed the water flowing into the chamber with as much regularity as that with which the atmospheric pressure from which it retreated was maintained.

I am Sir, yours, &c.
ROBERT CRICKMER.

Spa-road, Bermondsey, Jan. 30, 1854.

THE LATEST MARVEL. WAGNER'S PSYCHOGRAPH OR THOUGHT-INDICATOR.

WE have to present the lovers of the marvellous with a novelty which, although of equal interest with the wonders of Table and Spirit-rapping, is deficient of those *a priori* objections which have rendered these so unpopular among educated persons.

M. Adolphus Theodore Wagner, Professor of Music, of Berlin, has lately obtained provisional protection in this country for an instrument, the object of which is to *indicate a person's thoughts* by the agency of nervous electricity. The principal parts of the apparatus consist of a tracer, a disc upon which the operator is to lay his hand, and of an alphabet and set of numerals. Upon a person possessing nervous electricity placing his hand upon the disc referred to, the instrument immediately commences to work, and the tracer spells upon the alphabet what is passing in the operator's mind.

The Steam Engine for Practical Men, containing a Theoretical Investigation of the various Rules given in the Work, and several useful Tables, jointly written by JAMES HANN, A.J.C.E., Mathematical Master of King's College School, Author of various Works on Theoretical and Practical Science; and PLACIDO and JUSTO GENER, Civil Engineers. London. 1854.

IN a work written expressly for practical use, and for the theoretical instruction of those who may wish to make themselves acquainted with the scientific principles of the subject in hand, we do not look for any great amount of original matter. On the contrary, when a book is written for the express purpose of enforcing a new and original view of a subject, so much of the author's pains are necessarily bestowed on proving the error of the received theories, and illustrating those which he substitutes for them, that however valuable and transcendently excellent in a philosophical point of view the work may be, it loses many of those characteristics which give value to the hand-book and class-book, viz., brevity, absence of unnecessary verbiage and tautology, and precision. Thus De Pambour's most valuable Treatise on the Theory of the Steam-Engine, triumphantly as it disposes of all other theories, is not so well adapted for the purposes of a text-book, for the very reason that the author is necessarily so taken up with the business of refutation and of amply illustrating his own novel notions.

The book before us does not propose—nor does its scope demand—any great display of originality. It is enough for such a work that it bring the student up to the mark for the present time. The chief originality claimed is that of arrangement—keeping the practical rules and their theoretic investigation separate. This characteristic, however, is not peculiar to this book of Messrs. Hann and Geners; for in the excellent Treatise on the Marine Engine, by Messrs. Main and Brown, the same arrangement is pursued, with this difference, that the theoretic investigations are, for the most part, given in foot-notes.

Undoubtedly a considerable mass of useful matter is contained in the pages of this book; much of which, unquestionably, will be familiar to many of our readers, having appeared already in Mr. Hann's little Elementary Treatise on the Steam-Engine, and his Theoretic and Practical Mechanics. The association of the Messrs. Gener with him in this work was evidently with a view to supply all those practical details which cannot be looked for from the mere theore-

tic inquirer, but with which actual and constant experience alone can give an acquaintance. And their labours in this department have been attended with considerable success. We may refer especially to a very full and, as far as we know, original investigation of the effects of lap and lead of the slide, and the pages upon chimneys.

Having premised so much in its favour, it is our duty, as impartial critics, to point out what we consider the defects of this book, intended as it professedly is for practical use.

The first defect we have to complain of is the want of that division into *numbered paragraphs*, which has been always found of so much use by students and those who have need for frequent reference.

In the very first page we have an instance of the ill-effects of this bad arrangement: the Laws of Mariotte and a Definition of Work occurring together, without anything to mark the passage from one subject to another of an entirely different nature.

A second defect is the too general use of technical terms without previous definition; the definition itself sometimes being introduced in a supplemental manner, which must be very embarrassing to students who are grappling with the subject for a first time.

For instance, in page 3, the term load, as applied to the steam-engine, is defined, and that not very fully, in a foot-note.

On page 9 a similar kind of difficulty arises. An estimate of certain resistances is given; some of which are applicable only to high pressure engines: but there is nothing to show that such engines only are meant until the last line but one in the page. Again, there is, from the same cause, some confusion between the ideas of evaporation of the boiler and volume of steam evaporated per minute.

Again, we do not find any definition of *useful* load; the reader being left to gather what it means from examples. The same remark applies to the term Duty of the Engine, and many others too numerous to mention.

Our readers will obtain some idea of the practice of the authors to which we refer by a single instance. Every one acquainted with the subject knows how much difficulty tyros have in conceiving what is meant by *slip* of the screw; and, moreover, that the slip is estimated in two different ways; viz., either by the *actual* difference between the rates of the screw and the slip, or, which is for theoretical purposes more convenient, that difference reduced to a per centage. The reader, who, it is to be observed, may be for the first time making himself acquainted with this important matter, is left to draw all the information he can from the following sentence:

"Let it be required to find the pitch of a screw to make 60 revolutions per minute, the vessel expected to go 10 knots per hour, and the screw to 'slip' 15 per cent.; that is, while the screw goes 100 knots the ship shall go only 85."

Now, these we consider serious faults in a work which is designed to give *full* information to the inquirer.

Again, notwithstanding the professed intention of keeping the theoretical and practical portions of the subject quite distinct, there is, in the practical portion, a disquisition on steam, extending from page 63 to 67, no practical use whatever of which is, or can be made: another disquisition taken in part from De Pambour's work appears on the 101st and following pages, and a third again on the 154th page. Now, what object three distinct, and in some respects contradictory disquisitions on the same subject can serve, except that of confusing the unlucky wight who wishes to obtain clear ideas on this really difficult matter, it is impossible to conceive. To make the matter still worse, the *only theory of steam* practically applied to rules (pages 1—8) is inconsistent with all that the authors elsewhere tell us, or extract from books without a word of comment—viz., that which is known as Mariotte's law—that the steam in the cylinder expands without changing its temperature; and hence, that the pressure varies inversely as the volume occupied. The simplicity of this law seems to have been its great recommendation. But when it is considered, that in almost *every case* the pressure of steam in the cylinder undergoes very *considerable* changes (while this law may be taken as approximately true for only very *small variations*), and that in one large class of engines—viz., high-pressure, the variation is very great, as

much frequently as from 80 or 90 lbs. to 15 lbs. to the square inch; no apparent simplicity will compensate for the incorrectness of the results so obtained.

Again, De Pambour has shown, that for all *classes* of engines the change of *relative* volume (on which all calculations must depend), is expressed by the formula

$$\frac{\mu}{\mu'} = \frac{\frac{a}{\beta} + p'}{\frac{a}{\beta} + p}:$$

and Mariotte's Law would express the variation thus,

$$\frac{\mu}{\mu'} = \frac{p'}{p}:$$

It is hence evident, that the *correct* or *very approximately* correct formula is in a very small degree less simple than the incorrect formula which is *universally* used in the practical rules given. The useful load, horse power, &c., are actually calculated in the second part of the work on De Pambour's correct formula. We look in vain for the corresponding practical rules in the first part. Now, we readily concede that no possible advantage would accrue from puzzling the reader with two different sets of rules derived from two hypotheses: what we cannot understand is, that rules founded on a confessedly incorrect assumption, should be deliberately preferred to the more correct rules, especially as these latter are little, if at all, more intricate than the former.

But we have a graver fault still to find with our authors. There is sometimes a looseness of statement of fundamental truths which, in a work of this kind, is particularly injurious. The greatest care should be taken to state physical facts, especially with regard to a subject so really hard to comprehend as the generation and state of steam, simply, logically, and precisely. Even when this condition is carefully observed, it is very difficult to prevent misapprehension on the part of learners. But where looseness of expression is admitted, then confusion becomes doubly confounded. Now, we really believe that from this cause no person could obtain any adequately correct ideas of the generation and state of steam from the work before us.

Thus, on page 101, we read, "The relation between the pressure and temperature of steam is of great importance, and numerous experiments have been made to ascertain the pressure when the temperature is known, or to determine the temperature when the pressure is known."

Under what circumstances? This is an *important* part of the question, wholly omitted in the above statement. Then follows De Pambour's investigation.

Immediately after this, on page 102, we read, "*Another* useful property of elastic fluids has been discovered by the celebrated Gay Lussac," &c.

Now, would it not strike a learner that Gay Lussac's law and the law above investigated between the temperature and pressure of steam were both laws *equally* applicable to all elastic fluids? Yet nothing can be further from the truth than this. Gay Lussac's is an *universal* law; the other is applicable to steam only in a *particular state*. Again, in page 103, we read, "Now, neither the law of Mariotte nor that of Gay Lussac can apply alone to the changes which take place in the steam *whilst in contact with the fluid* from which it was evaporated; but from the two a third relation may be deduced, by which we may determine the variations of the volume of steam when there is a change in both the temperature and pressure at the same time."

Now, is not the fair and inevitable inference from these words this, that this "third relation" applies only or peculiarly to steam while in contact with the fluid from which it was evaporated, but not to steam when removed and shut up in a separate chamber? The real fact is, that the law deduced from Mariotte's and Gay Lussac's, viz.,

$$\mu = 1700 \times \frac{14{\cdot}706}{p} \times \frac{1 + {\cdot}00202(t - 32)}{1 + {\cdot}00202 \times 180}$$

is applicable to all elastic fluids, and to steam when separated from the generating fluid, and not *alone* to steam in contact with the generating fluid.

The real statement of the case is this:—steam, like any other elastic fluid, follows the law above deduced, whether separated or not from the water from which it is evaporated. In other words, the relative volume (μ) varies with the *pressure* and the *temperature* as independent variables, which may be thus mathematically expressed:

$$\mu = f(p, t) \qquad (1)$$

but whilst it is in contact with the generating water, it is always in the state of *greatest density* or pressure, corresponding to the temperature: in this case, any increase of temperature above that due to the steam pressure is consumed in converting an additional volume of water into steam. This is expressible by an equation of the form

$$p = \phi(t) \quad \text{or} \quad t = \psi(p) \qquad (2)$$

Hence, by virtue of (1) and (2) we deduce a third equation applicable only to steam in contact with the generating fluid, viz.,

$$\mu \int\left(p,\psi(p)\right) = F(p). \quad (3)$$

De Pambour shows that without sensible error this relation may be expressed by the simple formula—

$$\frac{\mu}{\mu^1} = \frac{a+\beta p^1}{a+\beta p}$$

Further, the dissertation on steam, page 154, would have found its place more properly here. All that this dissertation amounts to is this, that Regnault has discovered that Watt's law, viz., that the relation between the latent heat of steams of different temperatures and the sensible heat or temperature is such that their form is *constant*, is not *strictly* true. It *is*, however, so approximately true, that no sensible error is committed by assuming Watt's law in calulations for expanded steam.

This, we presume, is meant also by the disquisition, pages 63—65. As we have already observed, it would have been far better to join these three separate discussions into one. Had the authors, then, carefully stated the laws and their limitations, the student would have been far better guarded against error than at present.

Were Watt's law strictly true, it would follow that during the whole time the steam is used in the cylinder, if no loss of heat is sustained by its coming into contact with the sides of the cylinder, the steam is always in the state of maximum density for the temperature; and hence De Pambour's formula, for the relation of the relative volume and pressure is applicable throughout.

As a matter of fact, the condensation of the steam which occasions the departure from this law, is *very inconsiderable*.

The discussion on the indicator, we think, is far from being so complete and practical as it might be. Indeed no use of the indicator is mentioned, but that of determining the effective horse-power, or, as it is usually termed, indicated horse-power. The indicator is practically a most valuable instrument for detecting defects in the slide-valves and the cylinder itself.—*Vide* Main and Brown's "Treatise on the Indicator and Dynamometer."

We cannot agree with the authors, that their mode of viewing the action of the paddle-wheels is the most simple. We do not see how the idea of a succession of levers renders the matter intelligible, especially as the fulcrum of the lever must needs be outside the water.

An effective pressure must arise from the motion in the water of some instrument which has a *greater velocity* than the ship itself. In this view we believe the simplest way of considering the paddle-wheel to be that of a contrivance for obtaining an effective board or area, always moving in the water with a greater velocity than that of the vessel, and hence obtaining an effective moving force on the vessel. In this way French writers have obtained several useful practical deductions, which we look for in vain in the work under review.

That part of the book which has reference to the action of the screw, we conceive to be very meagre. The authors seem, in this and kindred discussions, to see some wonderful virtue in the factor, $\frac{W}{g}$. It is true that here it at last disappears; but we object to the introduction of such factors, unless it be at the same time clearly stated what W represents.

Finally, we assure the authors that we do not for a moment suppose that the inaccuracies we have pointed out arise from any inadequate apprehension of their subject on their part. We have exhibited them with the sole object, that in a future edition they may be corrected; and thereby the practical value of their book enhanced. We willingly bear testimony again to the existence of the large amount of really practical and useful information before us. We should like to see it better distributed, enlarged where required, and in some cases more logically stated.

We must not omit to mention our unqualified approbation of a letter, which one of the authors, Mr. Hann, addressed to the Editor of the *Nautical Standard*, on Negative Slip, which gives a rational explanation of it; one, moreover, which we have ourselves frequently heard from gentlemen most conversant with the subject, and able to give an opinion. We cordially concur in the judgment, "that it is something more than a paradox for a vessel to be propelled, by any power whatever, faster than the power is itself moving." We believe Mr. Hann's solution of the apparent anomaly to be not far from the truth.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Robinson, John, of Coleman-street, London, silk-throwster. *A new or improved apparatus for making tea and coffee and other infusions or decoctions for chemical and other purposes.* Patent dated July 20, 1853. (No. 1715.)

In the apparatus described by the inventor a tube is screwed down firmly, so as to prevent the air, steam, or liquid passing through from one to the other of two recep-

tacles, into one of which the ground coffee is then thrown. A pummel is slightly unscrewed, so as to admit air into the other receptacle, and a handle is depressed so as to open a stop-cock. Hot or cold water is poured into a cup, which running down the tube before mentioned, passes into the last-mentioned receptacle. When about half the water intended to be used has been poured into the cup, the funnel and the stop-cock must be shut, and the remainder of the water is then poured into the first receptacle and is mixed with the coffee.

SMITH, EDWARD DALTON, of Hertford-street, May-fair, Middlesex. *Improvements in crushing and washing ores and earths.* Patent dated July 20, 1853. (No. 1717.)

The machine that the inventor employs for crushing and washing the harder materials consists of a vertical axis supported by suitable framing within a box or chamber to which water is supplied, this axis being driven by suitable power; and a cross frame on the axis supports a series of hanging frames, each alternate frame carrying rollers, composed of toothed and spiked discs, and knives turning loosely on the suspended axes; the other suspended frames have curved blades at their lower ends, which in their revolution plough up and agitate the materials under treatment. Below the rollers and blades there is a rough and perforated plate, through which the finer particles of the matters pass away to the under part of the box or chamber, from which they flow away with the water, and are received in pockets or receivers, the water passing to a chamber, in which there is a rotating stirrer, and finally passing away through a sieve or strainer into a conduit, having cross bars on the bottom to arrest any fine particles of the matter which may have escaped in the water.

NORTON, JAMES SHIELD, and HENRY JULES BORIE, of Union-works, New Park-street, Southwark, engineers and iron-founders. *Improvements in the manufacture of tiles and stairs from plastic materials.* Patent dated July 20, 1853. (No. 1718.)

This invention consists in making each tile and stair hollow, or with hollow channels through them, by which they will admit of being better burned or fired. For this purpose plastic materials are to be forced through dies of the forms suitable to produce the external contour of the tiles or stairs, and in such dies cores are placed to produce the hollow channels

GOODMAN, JOHN DENT, of Birmingham, Warwick. *Improvements in lanterns.* Patent dated July 20, 1853. (No. 1719.)

This invention consists in constructing the glass which receives the oil or fluid, and the glass of the upper part which transmits the light, both in one piece. For this purpose there is a partition of glass formed between the upper and lower compartments of the lantern, in which partition is an opening to receive the wick-tubes or burner. The lantern has a perforated metal top, and, when desired, reflectors, and a guard or framing.

COCHRAN, ALEXANDER, of Kirton Bleach-works, Renfrew, North Britain, bleacher. *Improvements in finishing muslin and other fabrics.* Patent dated July 20, 1853. (No. 1721.)

Claims.—1. The application and use of steam or heated fluids or gases in heating irons or similar instruments, to be employed in smoothing or ironing, or similarly treating muslins or other fabrics in the piece or not. 2. The application and use in irons or similar instruments, heated by steam or other fluids, of one, two, or more flexible tubular connections with a steam-pipe or pipes, in such manner as simply to admit the steam to the interior of the iron, or to produce a current through the irons.

LILLEY, JOHN, of Thingwall, Woodchurch, Chester, merchant. *Separating the refuse vegetable matter contained in the stalk and leaves of the plantain species, and also trees grown in tropical climates from the fibrous materials of the same, in order that the latter may be manufactured into ropes or cordage, and for other purposes for which hemp and flax are used.* Patent dated July 21, 1853. (No. 1723.)

Claims.—1. A method of fixing knives or scrapers in connection with rollers. 2. The use of an elastic substance for the knives or scrapers to act upon, and the governing of their action by wedges. 3. The use of a comb in connection with the rollers for dividing the fibres.

BIRKETT, WILLIAM, of Manningham Mills, Bradford, York, chemist. *A method of cleansing or purifying and treating soap-suds or wash waters, so as to fit them to be again used for the washing of wools and other similar matters.* Patent dated July 21, 1853. (No. 1724.)

This invention consists in the addition or application of slaked lime to refuse soap-suds or wash-waters, which has the effect of clearing and throwing down the dirt and heavy particles, and may be used in greater or less quantities, according to the wish of the user; and, also, in adding carbonated or other alkali to the soapy matters remaining from such clearing.

MAYER, SIMON CHARLES, of Paris, France. *An improved domino-bearer.* Patent dated July 21, 1853. (No. 1725.)

Claim.—A described arrangement, or any other similar one, by which the dominoes used in playing are held in a box during the game.

THORP, WILLIAM, of Collyhurst, near Manchester, Lancaster, dyer, bleacher, and finisher. *Certain improvements in machinery for finishing and embossing plain and fancy woven fabrics.* Patent dated July 21, 1853. (No. 1726.)

This invention consists in combining one or more paper bowls with steam-heated rollers, the axes of which are all placed in the same plane, horizontal by preference, so that by means of simple mechanism any required degree of pressure may be produced between them, according to the requirements of the fabric to be finished.

COCKEY, EDWARD, HENRY COCKEY, and FRANCIS CHRISTOPHER COCKEY, of the firm of Edward Cockey and Sons, of the Frome iron-foundry, Frome, Somerset, engineers. *Improvements in the manufacture of cheese.* Patent dated July 21, 1853. (No. 1728.)

Claims.—1. The use of a double bottom or external chamber for the reception of a current of hot or cold water or steam. 2. The use of a pipe or vessel, placed inside the tub, for heating or regulating the temperature of the milk or whey contained therein. 3. A mode of making cheeses wherein the milk or whey is heated in the cheese-tub itself, by the aid either of steam or hot water, whether such heating medium be applied to the outside or the inside of the tub; and also the regulating of the temperature by currents of cold water similarly applied.

MURDOCH, JAMES, of Staple-inn, London, Middlesex. *An improvement in stamping or shaping metals.* Pated dated July 22, 1853. (No. 1729.)

Claim.—Forming the upper or moveable die used in stamping or otherwise shaping metals in two or more concentric pieces, and causing the outer or largest one to descend first, and the others in succession.

AUSTEN, ALEXANDER ISAAC, of Trinity-place, Wandsworth-road, Surrey, engineer. *Improvements in the apparatus used in the manufacture of mould candles.* Patent dated July 22, 1853. (No. 1730.)

This invention consists in combining glass with metal, in such manner that the glass shall form the interior or lining of the mould. For this purpose the inventor runs the melted metal on to the glass in a suitable mould.

GRAY, THOMAS, of Newcastle, tobacco manufacturer, and JOHN REID, of the same place, engineer. *An improved mode of manufacturing files and rasps.* Patent dated July 22, 1853. (No. 1731.)

Claim.—The cutting of two or more file or rasp blanks simultaneously, by bringing them under the action of a set of cutters connected to a reciprocating bar or lever, by means of a traversing-table.

GILLAM, JOHN, of Woodstock, Oxford, gentleman. *Improvements in apparatus for cleansing and separating corn, grain, and other seeds.* Patent dated July 22, 1853. (No. 1732.)

A full description of this invention is given in a former part of the present number.

SPENCER, GEORGE, of Manor-road, Walworth, Surrey. *Improvements in springs for carriages.* Patent dated July 22, 1853. (No. 1733.)

Claim. The employment of India-rubber in conical forms in combination with short cylinders of metal, one such cylinder being fixed at the largest diameter of each conical India-rubber spring.

RYLANDS, MARY ANN, of Kingston-upon-Hull, widow and administratrix of Joseph Rylands, deceased. *Improvements in yards and spars of ships and other vessels.* (A communication from her late husband, the late Joseph Rylands.) Patent dated July 22, 1853. (No. 1734.)

This invention has for its object improvements in building up pieces into a yard or spar, and consists in dividing a stick of timber (which is shorter than the desired yard or spar) longitudinally, and causing the two thick ends to be overlapped, dowelled, and hooped together—the two outer ends being made up by scarfing pieces connected by dowels and hoops. The inventor anticipated that, by this mode of construction, yards and spars would be of more uniform strength, and might be made from less costly timber than heretofore.

HUNTLEY, WILLIAM, of Ruswarp, near Whitby, York, engineer. *Improvements in engines worked by steam, air, or fluids.* Patent dated July 23, 1853. (No. 1736.)

In this invention each cylinder on the main or other shaft of the engine is provided with a valve-regulator, which is a circular body fitted with slide-bearings, that cause it to slide or work on guides or bars fitted on the same shaft, to which an eccentric is also firmly attached; and two cross bars or guides are placed on the opposite side of the regulator, to be acted on by the blocks or slides on the straps of the eccentric. The guides or bars are placed equidistant from the centre of the regulator. There is a rod for transmitting motion from the regulator to the rectifying lever, which is a double lever with a curved groove from end to end, and of a radius equal in length to the slide or valve-rod, which is fitted with a block at one end to move freely in the curved groove of the double lever, the other end being connected to a spindle, to give motion to the slide or valve.

Hall, John, of Bedford, machinist. *An improved mangle.* Patent dated July 23, 1853. (No. 1739.)

Claim.—Actuating the top pressing-roller by means of star-wheels, or other equivalent contrivance, which will always remain in gear, and yet admit of the upper rollers rising as the articles become lapped round the middle roller.

Napier, James Murdoch, of York-road, Lambeth, Surrey, engineer. *Improvements in letter-press and other raised surface printing-machines.* Patent dated July 23, 1853. (No. 1740.)

According to these improvements, the form passes from under the platten, and is inked by rollers which are in position for the form to pass under them, but which, as soon as, or rather before, the form has reached its extreme outward position, are made to move in their turn over the form, which remains for a time in the position it has obtained, to admit of the changing of the sheet, or in the case of double machines, during the time which is required to take an impression from the other form. The inking-rollers, immediately they have passed over the form, return to their first position, when the form will again move and pass under the rollers to its position under the platten, ready for printing, having been four times inked by the inking-rollers.

Barlow, junior, Samuel, of Stakehill, Lancaster, bleacher, and John Pendlebury, of Crumpsall, bleacher. *Certain improvements in machinery or apparatus for bleaching or cleansing textile fabrics or materials.* Patent dated July 23, 1853. (No. 1741.)

This invention consists in an arrangement of machinery whereby the inventors are enabled to employ high-pressure steam as a means of accelerating and more efficiently performing the processes mentioned in the title. They also use a top grid for the purpose of keeping the goods or materials to be operated upon in their place.

Howell, Joseph Bennett, of Sheffield, York, steel-manufacturer, and William Jamieson, of Ashton-under-Lyne, Lancaster, machinist. *An improvement or improvements in the manufacture of saws.* Patent dated July 25, 1853. (No. 1742.)

One part of this machine consists in a punching-apparatus, the punch and its die being of such a form as to punch or cut out the notches or spaces by which the teeth of the saw are formed. It is combined or not, as may be required, with a shearing or cutting apparatus, the action of which is to give a correct straight or curvilinear form to the edge of the plate of metal on which the teeth are to be cut. Another part of the machine consists in the directing-apparatus, by which fresh portions of the plate of metal are brought successively under the action of the punching and shearing-apparatus.

Clark, Alexander, of Gate-street, Lincoln's-inn-fields, Middlesex, engineer. *Improvements in regulating the speed and indicating the power of steam and other motive-power engines.* Patent dated July 25, 1853. (No. 1744.)

In this apparatus, the rotation of a bevel-wheel is communicated to another wheel mounted on a stud, which forms the opposite end of a lever. The last-named wheel is carried round and rises from its position, carrying the said lever round with it on a socket, as an axis, thus raising a piston, which compresses the air in the cylinder above the piston, and rarefies any that may be below it.

Ireland, William, of Leek, Stafford, gentleman. *Improvements in the mode or method of melting or fusing iron or other metals, and in the apparatus employed therein.* Patent dated July 25, 1853. (No. 1745.)

This invention consists—1. Of an improved method of feeding the furnace or cupola, by which any flame is prevented from appearing at or above the charging-door during the time of charging, and until the time of blowing down. This is accomplished by filling the furnace or cupola with fuel to about two feet above the twyer, previous to putting in any metal, and by then arranging the pigs of metal, or portions of the same, one upon another, crosswise, so that all the ends shall face the twyer, filling up the interstices so made with small parts of scrap metal and coke. 2. Of an improved shape or construction of the furnace or cupola, in which it is made much higher than previously, and has a taper form on the inside above the contraction, to prevent the metal sticking or crusting to the sides. The contraction is also made of a peculiar shape, having a large space below it, so as to afford room for a very large quantity of fused or melted metal. If the said space be larger than is required, the inventor introduces a false bottom in segments, so that the parts can be put in through the mouth of the furnace. 3. He introduces hot air by means of a common fan or blower, with suitable pipes and communications.

Bitten, Robert, of Dartford, Kent. *Improvements in apparatus for ascertaining and indicating the supply of water in steam boilers.* Patent dated July 25, 1853. (No. 1747.)

This invention consists of arrangements or combinations of apparatus for sounding a whistle, or other instrument, when the supply of water to a steam boiler is not correctly kept up, and also for indicating or point-

ing out on a dial the height of the water in a steam boiler. In these, floats are used, with vertical stems moving freely up and down in tubes, fixed through the upper parts of the boilers, and when notice is to be given by sound the upper part of the stem is made hemispherical to fit into a concave seat; so that, when the float descends by the lowering of the water in the boiler, the steam will rush through the tube to the whistle.

De la Rue, Warren, of Bunhill-row, Middlesex. *Means of treating and preparing certain tar, or naphtha, and applying products thereof.* Patent dated July 25, 1853. (No. 1748.)

Claim.—"The preparation of various solid and fluid hydro-carbons from Burmese or other natural naphtha, petroleum, or tars, in the manner described, and their application, when so prepared, to the purposes of illumination, manufactures, and lubrication; also for the employment of low-pressure steam, and afterwards super-saturated steam to the distillation of similar native compounds."

Ferguson, John, of the Heathfield Brick and Pottery Works, Glasgow, Lanark, North Britain, brick and pottery manufacturer. *Improvements in the manufacture of bricks and pottery.* Patent dated July 25, 1853. (No. 1749.)

Claims.—1. The use in kilns of open or permeable flooring with graduated apertures. 2. The use in open kiln floors, of bricks or tiles with graduated taper or inclined sides. 3. The mode of effecting superior combustion and preventing the formation of smoke, by the application and direction of air, as described.

Spieker, Charles Frederick, of New York, United States, professor of chemistry. *Improvements in generating and fixing ammonia.* Patent dated July 25, 1853. (No. 1750.)

Claims.—1. The generation or manufacture of ammonia from its elements obtained from the air, and the decomposition of water. Also, the use of highly oxidizable metals or salts for this purpose, as explained. 2. The use and application of gypsum or aluminous earths, for condensing and absorbing ammonia; and also the use of acids, or salts, in combination with the aluminous earths for fixing the ammonia. 3. Certain new applications of shells, corals, fossiliferous limestone, and fossil animal remains.

Newton, William Edward, of Chancery-lane, Middlesex, civil engineer. *Improved machinery or apparatus for stopping cables.* Patent dated July 25, 1853. (No. 1751.)

Claim.—The use of a ridge affixed to the deck of a vessel, between the hawse-hole and the windlass, in combination with a heavy pawl placed above it, so that in heaving up the anchor each moving link of the cable is turned flatwise in passing over the ridge, and each link is acted upon by the pawl, and prevented from running back.

Newton, Alfred Vincent, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved manufacture of cutting tools.* (A communication.) Patent dated July 25, 1853. (No. 1752.)

Claim.—Making the cutting-irons of moulding planes or turning tools of thin sections, which after being set to a pattern and confined in a clamp, may be brought to an exact edge by filing or grinding.

Banks, Thomas, of Derby, mechanical engineer, and Henry Banks, of Wednesbury, Stafford, iron merchant. *Improvements in apparatus for retarding and stopping railway trains, which improvements are also applicable to vehicles travelling on common roads.* Patent dated July 26, 1853. (No. 1757.)

This invention consists in applying breaks to the axles of carriages. The breaks are composed of metal discs mounted upon the axle, either fixedly or loosely, and of a feather which is employed to check the revolution; the whole being suitably combined.

Buxton, Thomas, of Malton, York, agricultural implement maker. *An improved mill for grinding.* Patent dated July 26, 1853. (No. 1758.)

We shall shortly give a full description of this invention.

Lyte, Farnham Maxwell, of Florian, Torquay, Devon, esquire. *Improvements in obtaining iodide of potassium when treating certain metals.* Patent dated July 26, 1853. (No. 1759.)

This invention "consists in the discovery that when the chlorides or some soluble salts of certain metals are placed in contact with solutions containing mixed iodides and chlorides, double decomposition ensues and insoluble metallic iodides are formed, and that by continuing the addition of the chlorides, this continues so long as any soluble iodide remains in the solution. Also that the insoluble iodide can afterwards be converted into a metal and a soluble iodide by any of the processes in use at present for the decomposition of metallic chlorides."

Barrans, Joseph, of Peckham-lane, Deptford, Surrey, engineer. *Improvements in steam boilers.* Patent dated July 26, 1853. (No. 1760.)

This invention has for its object improvements in Cornish boilers, or that class of boilers where the fires and flues are within them, and consists in applying to such a boiler a cylinder or chamber (or more than one) to contain water within the flue which

passes through the boiler, leaving space all round such vessel for a flue. This introduced vessel has a series of tubes through it, to increase the heating surface of the boiler; and there are water passages between the boiler and this vessel, in order that the water may flow freely from the one to the other.

HOPKINS, LANSING E., of New York, United States of America. *The manufacture of hat-bodies of fur and other like substances.* Patent dated July 26, 1853. (No. 1762.)

Claims.—1. Combining hardening rollers with a perforated cone by means of a yielding or hinged frame in which they are placed. 2. Giving to the said rollers, in combination with the perforated cone, a vibrating as well as a rotary motion, &c.

*** No. 1727 has never been allowed.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

ST. CHARLES, PHILIPPE POIRIER DE, of Fulham, Middlesex, engineer. *Improvements in stopping and starting vehicles.* Patent dated July 20, 1853. (No. 1720.)

The inventor places pinions on the naves of the wheels which it is desired to stop, and these are thrown into gear with racks acting simultaneously in the compression of a number of strong springs, thereby opposing a force to the further rotation of the wheels. The springs possess great tendency and force to recoil when brought to the closest state of compression, and are held so compressed during the stoppage of the carriage. After which the gearing of the racks and pinions are changed, so that the power of the springs is exerted to turn the wheels in a direction to propel the carriage forward, when it is desirable to proceed.

MILLS, JAMES, of Lower Brook-street, Grosvenor-square, Middlesex, gentleman's servant. *Improved machinery for propelling carriages.* Patent dated July 20, 1853. (No. 1722.)

This invention relates to the propulsion of carriages by manual labour. The inventor proposes to construct the running wheels of a greater diameter than usual, and to connect them to a fly-wheel, drum, or pulley, by means of a rod, one end of which is attached to a crank-pin, connected with one of the spokes of the running wheel, and the other end to a similar pin on the side of the drum, wheel, or pulley, which is made to oscillate or rock backwards or forwards by manual labour, and thereby impart rotary motion to the running wheels.

MANBY, CHARLES WILLIAM, of Grove-villas, Finchley, Middlesex, gentleman. *An improved shaving-brush, to be called "The Travellers' Patent Shaving-brush"* Patent dated July 23, 1853. (No. 1735.)

This invention consists of a cylinder made of wood, or other suitable material, with a brush fitted to one end, the cylinder being capable of containing a quantity of prepared soap. A moveable collet or button is fitted to the interior of the cylinder, so that it may be worked by the action of a screw, which can be turned by the operator from the outside.

LALANDE, AUGUSTE BUISSON, of Bordeaux, France. *Certain improved means for preventing accidents on railways.* Patent dated July 23, 1853. (No. 1737.)

This invention consists of a railway break, composed of a series of iron bars, connected to the extremities of other bars by screw-threads; the first rod being firmly attached to the first wagon of the train, and the other end connected to the bar placed under the second wagon.

WARNER, FREDERICK, of the Crescent, Jewin-street, London, and JOHN LEE, foreman. *Improvements in water-closets and urinals.* Patent dated July 23, 1853. (No. 1738.)

This invention consists in employing an inverted vessel, open at its lower end, to govern the time at which the supply of water to the basin of a water-closet shall be stopped after the handle is released. This inverted vessel has at its upper end a small hole for the passage of air, and according to the size of such hole and the quantity of the contained air so will be the time occupied in shutting off the supply of water. It is placed in another vessel, containing water or other fluid, from the bottom of which rises a central pipe with a valve at its upper end, so that when the inverted vessel is raised the air will pass freely into it through the large passage of the rising pipe; but on the handle being released, the valve on the rising pipe will close, and there will be no escape for the air, except through the small hole at the upper part.

DE ROSTIN, JOSEPH ARISTIDE FURST, of South-street, Finsbury, London, shipbuilder. *A new mode of constructing floating bodies.* Patent dated July 25, 1853. (No. 1743.)

The invention consists in constructing an external hulk, in the style of trellis-work, serving to inclose an internal hulk similarly shaped and constructed. The two are connected together by rods, the interstice or vacant space between them being filled with fascines made of materials of little value, such as bundles of wood, &c. These fascines may be rendered waterproof by felting or any suitable means.

COLLINS, JAMES, of Oxford, soap-maker. *Improvements in the manufacture of paper.* Patent dated July 25, 1853. (No. 1746.)

This invention consists in manufacturing paper from flax or hemp plants.

DAWSON, JOHN, of Linlithgow, Scotland, distiller. *A new instrument or apparatus for the purpose of preventing fraud in drawing off liquids.* Patent dated July 26, 1853. (No. 1753.)

This invention consists in the use of a distiller's or rectifier's safe, closed in every part except where the liquors pass into and out of it, instead of the open safe in ordinary use. The liquors pass through the apparatus as usual into the different vessels intended to receive them, but no liquor can be taken out for inspection without leaving its counterpart, by which the quantity, strength, and quality of that which is drawn off may be known; and this is effected by means of gauges, which receive the samples separately through pipes and valves, by which each sample is conveyed distinctly to the gauge, and in passing through the same is divided into two parts which pass separately into check-boxes, whereby the one part becomes exposed for inspection, while the other may be used as a check.

COLE, FREDERICK, of High-street, Camden-town, Middlesex. *An improvement of the lithographic press.* Patent dated July 26, 1853. (No. 1754.)

In place of the scraper now in general use, the inventor employs a cylinder which imparts sufficient pressure to the stone, to take off a correct impression. The said cylinder is connected with a frame which moves horizontally over the stone, and is worked by webs attached to a *rounce*-wheel capable of an alternate action.

COLE, FREDERICK, of High-street, Camden-town, Middlesex. *Facilitating and improving the process of inking in printing.* Patent dated July 26, 1853. (No. 1755.)

The object of this invention is to adjust the common inking table, now in general use as a separate machine, to the side of the press, opposite to the pressman when at work, the surface of it being nearly on a level with the surface of the type, so that one simultaneous action brought into play by the pressman's foot working on a pedal in front of the press, shall work the ink cylinder in one direction only, and the composition cylinder to and fro at pleasure on the inking table and over the types.

MONEY, ALFRED WALTER, of Chudleigh, Devon. *An improved bridle.* Patent dated July 26, 1853. (No. 1756.)

Mr. Money's bridle consists of a strap placed over the animal's nose, the separate ends of which strap are brought round in opposite directions under the jaw and run through rings or loops, which are attached to the strap on each side; the ends are then taken through the rings of the snaffle, and buckled on to the rein. The object of this strap, or nose-band, is to partially prevent respiration, by pulling the rein, and thus pressing the strap on to the nose.

GIBLETT, JOHN, of Trowbridge, Wilts, woollen cloth manufacturer. *Improvements in the manufacture of woollen cloths and other fabrics.* Patent dated July 26, 1853. (No. 1761.)

This invention consists of means of obtaining a more uniform tension of the warp-threads in passing from the creel to the warp-beam, by which the fabrics woven will have more level surfaces. The yarns in coming off pass over and under friction-bars, which are made moveable so as to have the tension required and placed at any angle. The yarns then pass through the eyes, and from thence to a guide, and passing through this guide all the threads fall side by side and with uniform tension on to the warping-mill as it goes round.

PROVISIONAL PROTECTIONS.

Dated November 8, 1853.

2595. George Shepherd, of King William-street, London, civil engineer. Certain improvements in the construction of railways.

Dated November 19, 1853.

2689. Auguste Castets, civil engineer, of Paris, France. An improved composition for curing diseases in the feet of animals.

Dated December 5, 1853.

2827. Edward Lavender, of Deptford, Kent, general trader. Improvements in apparatus for subjecting substances to the action of heat, for the purpose of carbonizing, calcining, or combining such substances or for subjecting such substances to the process of distillation.

Dated December 16, 1853.

2933. Charles Goodyear, of St. John's-wood, Middlesex. Improvements in the treatment and manufacture of India-rubber. Partly a communication.

Dated December 27, 1853.

2996. Edward Joseph Hughes, of Manchester, Lancaster. Improvements in sewing-machines. A communication.

Dated December 28, 1853.

3011. Samuel Barnes, of Oldham, Lancaster, machine-maker. A certain improvement or improvements in the construction of looms.

Dated January 7, 1854.

37. William Aspden, of Blackburn, Lancashire, overlooker of power-looms. Certain improvements in looms for weaving.

39. Anthony Bernhard Baron Von Rathen, of Wells-street, Middlesex. Improvements in chimnies and flues of houses, and in stoves to be employed therewith, whereby better draught will be obtained, consumption of fuel will be diminished, smoke, fog, and night damp will be prevented from entering apartments, more warmth will be thrown out, and whereby fire in the chimney can be readily extinguished.

41. John Henry Johnson, of Lincoln's-inn-fields,

Middlesex, gentleman. Improvements in machinery or apparatus for effecting agricultural operations, and in communicating power thereto, parts of the said improvements being applicable to the obtainment of motive power for general purposes. A communication.

43. John George Taylor, of Glasgow, Lanark, North Britain, merchant. Improvements in writing-apparatus.

Dated January 9, 1854.

45. Benjamin Burleigh, of the Great Northern Railway, King's-cross. Improvements in railway switches and chairs.

47. Richard Albert Tilghman, of Philadelphia, United States of America, chemist. Improvements in treating fatty and oily matters, chiefly applicable to the manufacture of soap, candles, and glycerine.

49. William Garforth and James Garforth, both of Dukinfield, Chester, engineers. Certain improvements in mechanism or apparatus for retarding or stopping the motion of locomotive engines and other railway carriages.

51. William Taylor, of How-wood, Renfrew, North Britain, merchant. Improvements in furnaces and fireplaces, and in the prevention of smoke.

Dated January 10, 1854.

53. William Brown, of Bradford, York, mechanic. Improvements in preparing to be spun wool and other fibrous material.

55. The Reverend William Renwick Bowditch, of Wakefield, York, clerk, bachelor of arts. Improvements in economising fuel, and in the more economical production of light and heat.

57. Elmer Townsend, of Boston, Massachusetts, United States. Improvements in machinery for sewing cloth, leather, or other material. A communication from William Butterfield and Edgar Mantleburt Stevens, of Boston, in the State of Massachusetts.

59. John Ralph Engledue, of Southampton, Hants, superintendent of the Peninsular and Oriental Steam Navigation Company, and Thomas Burningham, of Millbrook, same county, clerk. Improvements in furnaces.

61. William Littell Tizard, of Aldgate, London, engineer. Machinery for stamping, crushing, washing, and amalgamating gold and other ores.

Dated January 11, 1854.

63. Joseph John William Watson, of Old Kent-road, Surrey, doctor of philosophy. Improvements in signalling.

64. Henry Bennettsmith, of St. Sepulchres, Middlesex, gentleman. A machine for mowing or reaping all kinds of corn, grass, clovers, or any other field growth and lawns.

65. Daniel Semple, of the 1st Bombay European Regiment Fusiliers, now at Aden, South Arabia. An improved guide for the finger-boards of musical stringed instruments.

67. Felix Lieven Bauwens, of Pimlico, Middlesex, manufacturer. Improvements in treating fatty matters previous to their being employed in the manufacture of candles.

69. Ralph Lister, of Scotswood, Northumberland, brick-maker. Improvements in distilling-apparatus.

71. Henry Beaumont Leeson, of Greenwich, Kent, M.D. Improvements in gas-burners.

73. Antoine Ponçon, of Marseilles, France. Obtaining a motive power.

Dated January 12, 1854.

74. John William Wrey, of Upper Berkley-street West, Middlesex, Esq. A new and improved method of transmitting motion.

75. Thomas Waller, of Ratcliff, Middlesex, ironmonger. Improvements in register stoves and other stoves or fireplaces.

76. Thomas Edwin Moore, of St. Marylebone, Middlesex, engineer. Improvements in apparatus to be used for extinguishing fires.

78. John Fuller Boake, of Dublin, lampist to the Great Southern and Western Railway of Ireland. Improvements in and applicable to certain lamps or lanterns, so that either candles or oil may be used therein with facility.

79. John William Partridge, of Birmingham, Warwick, gentleman. Certain improvements in the manufacture of soap.

80. John Bethell, of Parliament-street, Westminster, gentleman. Improvements in manufacturing coke.

82. Thomas Frederick Henley, of Cambridge-street, Pimlico, Middlesex, merchant. Improvements in the preparation of certain colouring materials.

83. Auguste Edward Loradoux Bellford, of Castle-street, Holborn, London. An improvement in the manufacture of glass. A communication.

84. Samuel Wilkes, of Wolverhampton. Improvements in the construction of chairs and rails for railways.

85. John Henry Johnson, of Lincoln's-inn-fields, Middlesex. Improvements in the preparation of glycerine, and in its application. A communication from Victor Courboulay, of Paris, France, chemical engineer.

86. Robert Maclaren, of Glasgow, Lanark, North Britain, engineer. Improvements in moulding or shaping metals.

Dated January 13, 1854.

88. Arthur Parsey, of Crescent-place, Burton-crescent, in the parish of St. Pancras, Middlesex. Improvements in machinery for obtaining and applying motive power by means of compressed air and other fluids.

89. Patrick O'Malley, of Dublin, brewer. The manufacture of a new drink or beverage from certain vegetable and other substances, and the conversion thereof into vinegar.

90. Thomas Bennett Foulkes, of the firm of Abel and Thomas Bennett Foulkes, of Chester, Chester, glove-manufacturers. Improvements in the manufacture of self-adjusting gloves.

91. John Wilkinson, of Manchester, Lancaster, die maker. Improvements in the manufacture of dies for producing printing surfaces for calico-printers, applicable also to embossing.

Dated January 14, 1854.

93. James Bird, of St. Martin's-lane, Westminster, mechanic. An improvement in taps and cocks.

94. Julius Jeffreys, of Carlton-villas, Maida-vale, Middlesex. Improvements in the manufacture of mineral charcoal and coke, and in adapting open grates for the combustion of them.

95. Arthur Dobson, of Bolton-le-Moors, Lancaster, commission-agent. Certain improvements in looms for weaving.

Dated January 16, 1854.

96. Charles Frederick Stansbury, of Cornhill, London. A new and improved mode of propelling machinery. A communication from Bernard Hughes, of Rochester, in the State of New York, and United States of America.

97. William Crosskill, of Beverley, York, civil engineer. Improvements in construction of portable railways.

98. James Newall, of Bury, railway-carriage builder. Improvements in machinery or apparatus for stopping or retarding the progress of railway and other carriages, and in the mode or method of connecting two or more carriages with the said apparatus together.

99. Philip Grant, of Manchester, Lancaster, stationer and letter-press printer. An improved rol-

ler used in the processes of letter-press, copper-plate, and lithographic printing.

100. Peter Blaker, of Crayford, Kent, brick-merchant, and William Wood, of Chancery-lane, London, Middlesex, civil engineer. A machine for crushing coal, and the refuse arising from the combustion of coal used for brick-making and other purposes.

101. George Fergusson Wilson, of Belmont, Vauxhall, managing director of Price's Patent Candle Company. An improvement in the manufacture of candles and night-lights.

103. Penrose Goodchild Julyan, of Bath-street, Birmingham. Improvements in communicating signals to engineers, guards, and others in a moving railway train.

104. Joseph Spires, of Lower Drummond-street, Euston-square, Middlesex, gun-maker. Improvements applicable to boots and shoes.

Dated January 17, 1854.

106. William Brown, of the parish of St. George, Camberwell, Surrey, engineer. Improvements in printing-machinery.

108. Edward Highton, of Regent's-park, Middlesex, civil engineer. Improvements in suspending the wires of electric telegraphs.

110. Robert Maclaren, of Glasgow, Lanark, North Britain, engineer. Improvements in moulding or shaping metals.

112. Karl Weber, of Rechtberg, Wurtemberg. Improvements in the manufacture of boots and shoes.

Dated January 18, 1854.

114. William Blackett Haigh, of Oldham, Lancaster, machine-maker. Improvements in machinery or apparatus for tennoning, mortising, slotting, cutting, or shaping wood or metal.

118. William Batten, surgeon, of Westbourne-street, Pimlico, Middlesex. An improvement in the construction of a sink, drain, or gulley-trap, named the self-acting effluvium trap, for the more effectual conveyance of all liquids or admixtures in passing into drains, sewers, cesspools, or other receptacles, and the better prevention and exclusion of all vapours, effluvia, or gases arising therefrom.

120. William Thomas, of Cheapside, London. Improvements in stays.

122. Charles Howard, of Trafalgar-terrace, Hoxton, Middlesex. Improvements in the manufacture of iron.

Dated January 19, 1854.

126. George Henry Bursill, of Offord-road, Barnsbury-park, Islington, and of the Ranelagh-works, Pimlico, Middlesex, engineer and assayer of minerals. Improvements in operating upon metalliferous ores and other minerals, and upon slags and sweep, in order to facilitate the separation and recovery of the metals and other products; also in machinery or apparatus for effecting such improvements, which is in part applicable to other purposes.

128. Alexander Dalgety, of Florence-road, Deptford, Kent, engineer. A new construction of rotatory engines or pumps.

130. Thomas Webb, of the Platts Glass-works, Stourbridge, glass-manufacturer. Improved apparatus applicable to the annealing of glass and the firing of pottery ware.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

147. Henry Watson, of High bridge, Newcastle-upon-Tyne. Improvements in water-closets. January 21.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January 27th*, 1854.)

1972. Alfred Augustus de Reginald Hely. Certain improvements applicable to shades or chimneys for lamps, gas, and other burners.

(*From the "London Gazette," January 24th*, 1854.)

2010. Joseph Cundy. Improvements in gas stoves.

2056. Joseph Alsop and Edward Fairburn. Improvements in baking bread.

2062. Benjamin Hustwayte and Richard John Paul Gibson. An improved composition or compositions applicable to the manufacture of bricks, tiles, and other moulded articles.

2080. Charles Askew. Improvements in baths.

2103. William Weild. Improvements in lathes and in apparatus connected therewith, for cutting, turning, or boring wood, metal, or other substances.

2104. John Wright Child and Robert Wilson. Improvements in valves and pistons.

2160. John Adcock. Improved apparatus for measuring the distance travelled by vehicles.

2193. Edward Oldfield. Certain improvements in machinery for spinning and doubling.

2204. Alexander Dalgety. Improvements in lathes.

2221. John Barsham. Improvements in the manufacture of bricks, tiles, and blocks.

2222. John Henry Johnson. Improvements in machinery or apparatus for cutting paper. A communication from Monsieur Poirier, of Paris, mechanical engineer.

2253. Michael Dwyer and James Brown. An improvement in anchors.

2517. Damiano Assanti. A new or improved cooling and freezing mixture.

2689. Auguste Castets. An improved composition for curing diseases in the feet of animals.

2795. Alfred Isaac Jones. An improved cigar light.

2803. Henry Deacon and Edmond Leyland. Improvements in apparatus for the manufacture or production of sulphuric acid.

2827. Edward Lavender. Improvements in apparatus for subjecting substances to the action of heat, for the purpose of carbonizing, calcining, or combining such substances, or for subjecting such substances to the process of distillation.

2933. Charles Goodyear. Improvements in the treatment and manufacture of India rubber. Partly a communication.

2958. Paul Wagenmann. Improvements in the manufacture of liquid hydro-carbons and parafine.

3035. Alfred Trueman and Isham Baggs. Improvements in grinding, amalgamating, and washing quartz and other matters containing gold.

7. Peter Armand le Comte de Fontainemoreau. Certain improvements in water wheels. A communication.

23. David Blair White. Improvements in the manufacture of waterproof fabrics and of waterproof bags, and other like articles.

38. William Edward Newton. Improved machinery for dyeing, washing, and bleaching fabrics. A communication.

41. John Henry Johnson. Improvements in machinery or apparatus for effecting agricultural operations and in communicating power thereto, parts of the said improvements being applicable to the obtainment of motive power for general purposes. A communication.

47. Richard Albert Tilghman. Improvements in treating fatty and oily matters, chiefly applica-

ble to the manufacture of soap, candles, and glycerine.

52. Edward Tyer. Improvements in giving signals on railways by electricity and in instruments and apparatus connected therewith.

57 Elmer Townsend. Improvements in machinery for sewing cloth, leather or other material. A communication from W. Butterfield and E. M. Stevens, of Boston, Massachusetts.

62. Ambroise Auguste Masson. Improvements in the manufacture of thread or wire to be used for making gold or silver lace.

63. Joseph John William Watson. Improvements in signalling.

68. Richard Archibald Brooman. Improvements in extracting gold from the ore. A communication.

75. Thomas Waller. Improvements in register stoves and other stoves or fire-places.

78. John Fuller Boake. Improvements in and applicable to certain lamps or lanterns, so that either candles or oil may be used therein with facility.

86. Robert Maclaren. Improvements in moulding or shaping metals.

101. George Fergusson Wilson. An improvement in the manufacture of candles and night lights.

108. Edward Highton. Improvements in suspending the wires of electric telegraphs.

110. Robert Maclaren. Improvements in moulding or shaping metals.

126. George Henry Bursill. Improvements in operating upon metalliferous ores and other minerals, and upon slags and sweep, in order to facilitate the separation and recovery of the metals and other products, also in machinery or apparatus for effecting such improvements which is in part applicable to other purposes.

128. Alexander Dalgety. A new construction of rotatory engines or pumps.

147. Henry Watson. Improvements in water closets.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed January 27, 1854.

1766. Peter Armand Lecomte de Fontainemoreau.
1768. Edward Herring.
1771. Thomas Forster.
1820. William Hickson.
1823. Charles Buttler Clough.
1826. Barthelemy Louis François Xavier Flechelle.
1835. James Lee Norton.
1850. Thomas Young Hall.
1869. Thomas Kelby Hall.
1891. William Aldred, Richard Fenton, and William Crone.
1940. Frederick William de Fabeck.
1985. Richard Roberts.
2076. Michael Leopold Parnell.
2167. Henry Constantine Jennings.
2290. Charles Augustus Holm.
2467. Weston Grimshaw.
2486. George Edward Dering.
2612. James Willis.
2643. Charles Emilius Blank.
2683. Patrick Benignus O'Neill.
2737. Samuel Cunliffe Lister.
2739. William Jones.
2743. John Berry.
2744. William Calder.
2805. George Williamson.
2807. John Charles Wilson.
2811. Henry Bessemer.
2854. William Edward Newton.

Sealed January 28, 1854.

1777. William Edward Newton.

Sealed January 30, 1854.

1779. William Thomas Henley.
1879. Louis Van Caneghem.
1948. William Vaughan and John Scattergood.
1953. Auguste Edouard Loradoux Bellford.
2029. John Tayler, James Griffiths, and Thomas Lees.
2232. James Griffiths.

Sealed February 1, 1854.

1788. John Smeeton.
1805. Antoine Joseph Quinche.
1843. Robert Morrison.
1868. Thomas Dewsnup.
2207. Charles Maitland and William Gorrie.
2224. Joseph Fermont Van Waesberghe.
2308. George Lifford Smartt.
2615. John Platt.
2639. William Smith.
2678. Amédée François Rémond.
2723. John Hill, senior, and John Hill, junior.
2745. William Leigh Brook and Charles Brook, junior.
2757. Joseph Stenson.
2765. Joseph Michel Henri Perodeaud.
2815. Charles Buck.
2823. Matthew Andrew Muir.
2835. Robert Christopher Witty.
2843. John Getty.
2851. Joseph Robinson.
2875. Henry Bessemer.

Dated February 2, 1854.

1802. William Perks, junior.
1804. William Henry Clarke.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

J. Laidler.—The work you refer to is "Iago's Ropemaking made Easy," and not "Dalby's," as was accidentally printed. You were quite right as to the publisher.

Edward Cocks.—We omitted to state that your communication was received with thanks.

Civis.—The Editors of "The Chemist" would probably supply you with the information you require.

J. King, and a New Subscriber ask whether "among the numerous inventions professing to give motive power, there are not some worthy of a full description" in our pages. We have not yet met with one which, from its excellence, has had a special claim upon our space, although much ingenuity is frequently manifested in such inventions. On the other hand, our readers must be aware, from the information afforded in our abstracts, that many of them are both useless and absurd. We shall not fail to give prominence to any remarkable invention for obtaining a motive power.

Joseph Lowery.—The question you wish us to insert was answered at length by ourselves in reply to a correspondent, *David Hope*, in our number for December 17, 1853. In reading the reply there given, please attend to the *Errata* published in the following number.

R. Crickmer.—"Whether graphite, plumbago, or black-lead, is a metallic substance," is a question upon which various opinions have been entertained. Camden, the historian, calls it "a metallic earth;"—Boyle calls it "a mineral, *sui generis*," and says that "it has nothing metallic in its nature;"—Scheele showed that it might be wholly converted into carbonic acid gas, except a small residuum of iron;—Vanuxen found that the Borrowdale varieties contained carbon, water, silica, alumina, and oxides of iron and manganese;—and Ure says "it consists of carbon in a peculiar state of aggregation, with an extremely minute *and apparently accidental* impregnation of iron."

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Mechanics' Magazine.

No. 1592.] SATURDAY, FEBRUARY 11, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

RODEN AND THOMAS'S PATENT IMPROVEMENTS IN ROLLING METALS.

Fig. 1.

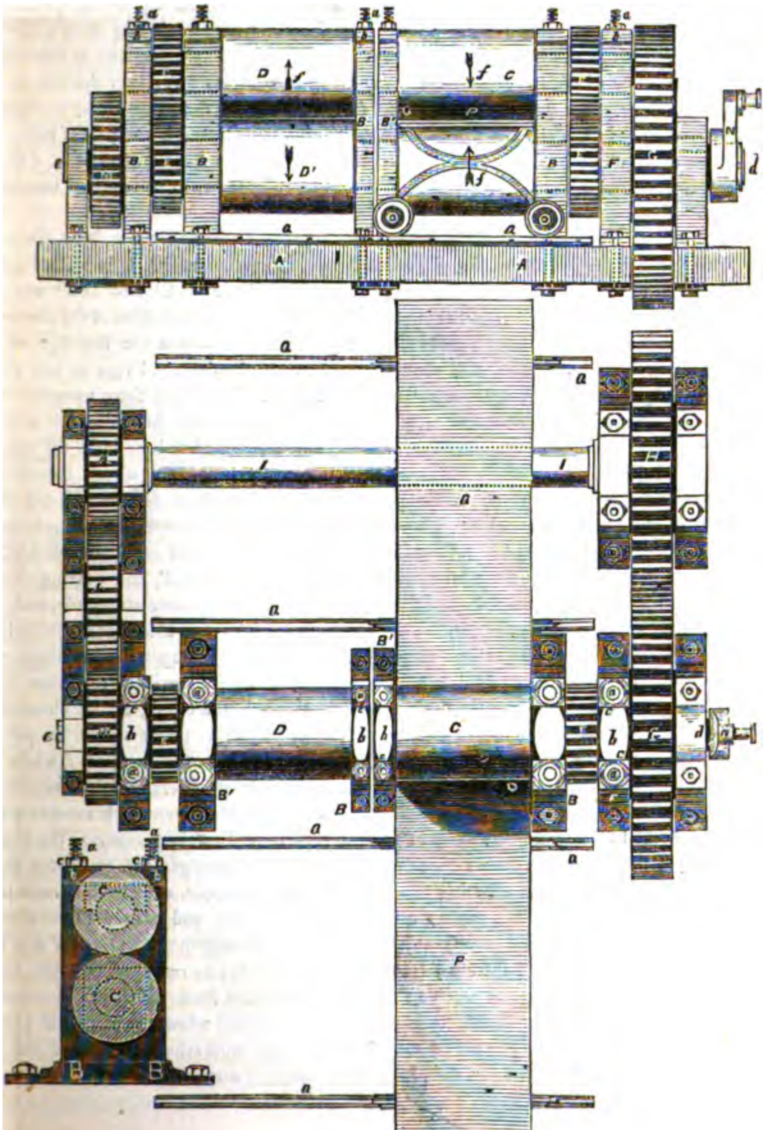


Fig. 2.

Fig. 3.

RODEN AND THOMAS'S PATENT IMPROVEMENTS IN ROLLING METALS.

(Patent dated August 3, 1853.)

In rolling metals according to the method usually employed, one or more pairs of rolls are connected together, and the piece of metal requiring to be rolled is passed between them, and is then lifted over the top roll, and again passed through the rolls, which operation is repeated till the metal is brought to the required shape or thickness. Another plan consists in stopping the motion of the rolls when the bar has passed through, then reversing the rolls, and putting it through in a contrary direction, by this means saving the trouble of passing the bar over the top roll. In all cases, the rolls revolve in the same direction. Messrs. Roden and Thomas's invention, however, consists in employing two or more pairs of rolls, unconnected with each other, and revolving in contrary directions the one to the other; the two or more pairs of rolls being driven either by the same or by a separate moving power. Thus, when a bar or plate is rolled, it passes through one pair of rolls, and is then moved to the other pair, either in accordance with the present system or by a moveable carriage made for the purpose. The operation is repeated till the required section is obtained.

Figs. 1 and 2 of the accompanying engravings represent respectively a front elevation and plan of two pairs of rolls arranged according to this invention. A A is a strong base or foundation, to which the standards, B B^1, are firmly bolted. C C^1 and D D^1 are two pairs of rolls mounted in brasses in the standards, B B^1. The upper portion of the standards are formed with strong screws, *a a*, and also that part of them above the bearings of the under rolls are formed with a parallel opening, as shown in the detached view of one of the standards in fig. 3, whereby the upper rolls can be removed by sliding them upwards, they being retained when in their place by means of bars, *b b*, which have holes in each of their ends, whereby they are passed over the screws, *a a*, and are caused to bear upon the brasses of the upper rolls by means of the nuts, *c c*. E E are two pairs of spur-wheels keyed upon the bearings of the pairs of rolls, for the purpose of coupling them respectively together. The bearing, *d*, of the lower roll, C^1, is made much longer than the corresponding bearing of the roll, C, and is supported in a separate standard, F, also bolted to the foundation, A. G is a spur-wheel, keyed upon the bearing, *d*, outside the standard, F, and gearing into a similar spur-wheel, H, upon the shaft, I. This shaft turns in suitable standards, and has keyed upon its opposite end a spur-wheel, K, which gears into the intermediate wheel, L, the teeth of which also take into those of the spur-wheel, M, keyed upon the bearings, *e*, of the lower roll, D^1. By means of this arrangement of wheel-work, it will be seen that, upon motion being communicated to the spur-wheel, G, through the crank, N, which may be connected in any suitable manner to a steam engine or any other prime mover, the pair of rolls, C C^1, will be caused to revolve in one direction, say in that of the arrows, *f*, while the intervention of the intermediate wheel, L, will cause the pair of rollers, D D^1, to revolve in the contrary direction, or in that of the arrows, *g*. Although the inventors have shown this particular method for causing the pairs of rolls to revolve in directions contrary the one to the other, yet they do not confine themselves to this precise arrangement, as various other methods may be adopted for effecting this purpose. For example, each pair of rolls may be separately coupled to a steam engine or other prime mover, and caused to revolve in contrary directions by means of any suitable reversing arrangement. O and P are two carriages or trucks placed on opposite sides of the rolls, and free to run upon the rails, Q Q. The purpose of these trucks is to receive the metal as it issues from the rolls, in order to be conveyed, by shifting the truck, to the next pair of rolls, when the metal is passed between them, and received upon the opposite truck. This operation is repeated till the metal is of the required shape and thickness. The gauge or distance between the rolls can be regulated by the nuts, *c c*.

DRAINAGE.—MACADAMIZED ROADS.

At the Meeting of the Institution of Civil Engineers, on January 31, 1854, on reading the minutes of discussion of the meeting of January 24th, attention was directed to the statement of the experiments recently made at Alnwick, on the quantity of water discharged through a "pot-pipe" of 18 inches diameter; for, while on the one hand, the results of the experiment sufficiently confirmed the accuracy of the formulæ of Du Buat, Eytelwein, Smeaton, Prony, Hawksley, and other investigators, and as decidedly contradicted the results published in the Blue Books emanating from the Board of Health, these results, nevertheless, differed too considerably from other consistent conclusions to be fully relied upon, and it was, therefore, desirable that this experiment should not be taken as a datum upon which to found any hydraulic law for the determination of the quantity of water which might be transmitted through tubes. For this purpose, indeed, the cited experiment must be deemed unsatisfactory; because pot-pipes were never of uniform or exact diameter,—inclinations were always more or less vaguely stated, joints were seldom sound, and when the discharge was into free space, the differential level was rarely satisfactorily afforded. Moreover, this experiment itself was in some respects contradicted by very carefully-conducted experiments, made by Monsieur Couplet, at Versailles, on a pipe 18 inches in diameter, the results of which were extremely consistent with the mathematical determinations successfully resorted to by all practical hydraulic engineers.

The experiment by M. Couplet was made on a pipe of 43,200 inches long, and 18 ins. diameter; the motive head was 145 inches (all French measures); the calculated velocity was 40½ inches, while the observed velocity was 39½ inches, differing from the velocity calculated from established formulæ only about 3 per cent.

It was also contended to be extremely undesirable that centralized authorities should continue to exist, as it was uniformly found that these authorities did great mischief by the wide dissemination of errors, apparently under Government influence, and by the consequent repression of scientific and practical improvements.

The paper read was "On Macadamized Roads for the Streets of Towns," by Mr. J. Pigott Smith, Assoc. Inst. C. E.

The lengthened experience of the author, as Surveyor to the Corporation of Birmingham, having under his charge about 150 miles of street road, and 50 miles of turnpike road, enabled him to express confident opinions on the comparative cost, durability, and general qualities of paving, and of broken stone, for roads, and even for streets, subject to a considerable amount of heavy traffic.

The parties chiefly interested in having good roads, were shown to be the owners of carriages and horses, and the ratepayers, at whose expense the roads were originally constructed and subsequently maintained. For both these classes, "cheap roads" (that is, those of small first cost) were contended, generally, to be the dearest; horse-power being uselessly expended, carriages destroyed, and constant repairs to the surface of the road being necessitated. Any undue increase of tractive power was shown to fall, indirectly, on all who purchased any commodities conveyed through the streets, and the annoyances and hindrances to commerce, arising from ill paved, or ill-kept, muddy, dirty, and noisy streets, were patent to all. The necessity was thence deduced for having the roads and streets so constructed that the surface should be firm, even, and smooth, without being slippery, and be free from mud or dust, or loose stones.

To attain this, the foundation should be of firm material, well consolidated, and perfectly drained, then covered with stones, broken to uniform dimensions, well raked in, and fixed by a binding composition of grit, collected during wet weather by Whitworth's sweeping-machine, and preserved for the purpose. This binding being regularly laid on, and watered, if in dry weather, would, in great thoroughfares, consolidate the new metal in a few hours, preserving the sharp angles of the stones, which assume all the regularity of a well-laid pavement, with a considerable saving of material, and a firmer crust than by the ordinary method of allowing the vehicles to pass, for many days over the uncovered surface of the new stones, grinding off the angles, with a deafening noise, and forming dust or mud, to be carried on to the footpaths and into the houses and shops.

Instances were given of the advantages of this system, of using the grit for binding, which should, however, be that collected by the sweeping-machines, and not mere slimy mud.

A street in Birmingham, subject to great traffic, had been thus perfectly made and consolidated in five days, whereas, under the ordinary system, three months would have been required to produce the same effect.

The repairs were capable of being effected at any period of the year; under no circumstances were the street surfaces permitted to be worn down, and they were never

stopped, as was the case for lifting and repaving.

Rules were then given for keeping the surface in perfect travelling order, for picking off all loose materials, for sweeping and never scraping, for preserving the profile of the surface, and getting rid of all lodged water, for light watering in dusty weather, and heavy watering when there was adhesive mud, that could not be otherwise removed, by the long brushes of Whitforth's sweeping-machines, which were contended to be indispensable for keeping roads and streets in good repair, and for preventing the nuisances of mud and dust.

The system employed in London, of heavy watering, without removing the mud, or of scraping and of hand-sweeping, and lifting by shovels into carts, was shown to be bad and expensive. The loss of speed, and the extra power required to be exerted by horses drawing carriages over street surfaces in the state of those in London, were shown to be as much as twenty-five per cent. as compared to the work done in Birmingham. The employment of a better system, combined with the use of the sweeping-machines, had been productive at Birmingham of an economy of nearly one-third of the materials employed for the construction and repairs of the streets and roads.

Instances were given of the actual results of the system of washing and sweeping parts of the Quadrant, Regent-street, where the method had been satisfactorily proved to have produced superior effects; but prejudice had induced obstinate adherence to the old system, to the annoyance of the public, and with the derision of all foreigners who visited the metropolis. The actual state of all the leading thoroughfares could vouch for the justice of the criticism on the present metropolitan system.

The greatest amount of wear and tear of macadamized street surface in Birmingham was shown to be four inches per annum; the average might be therefore taken at two inches; the cost of maintenance was fourpence per superficial yard, and that of watering and cleansing was twopence, giving a total of sixpence per yard per annum.

Paving cost fifteen shillings per yard, it required to be renewed once in fifteen years, and the cleansing cost about one-halfpenny per yard. Paving was, therefore, evidently about double as expensive as macadamizing at Birmingham.

It was, therefore, contended that macadamized roads and street surfaces, if properly constructed and carefully managed, well water-cleansed for mud and watered for dust, brushed or swept by machinery, maintained with an uniform surface, and not permitted to become degraded, were well adapted for towns and cities of average traffic, and for many localities in and around the metropolis.

LIPSCOMBE'S IMPROVEMENTS IN SHIP-BUILDING.

To the Editor of the Mechanics' Magazine.

Sir,—"N. B." in criticising my tract upon improvements in the form of ships and boats, which I have printed and give away gratuitously, has shown so little knowledge of the art of shaping ships, that he ought to have left a critique upon it to abler hands. In that tract I state that the resistance of water to bodies moving on its surface, having wedge-shape fronts, with sterns of a proper length and shape, is lessened in proportion as the length of the wedge exceeds its greatest *width*—but somewhat differently when an inclined plane is placed before the same stern; as the inclined plane lessens the resistance of water to its motion in proportion as its length exceeds its greatest *depth*. I claim the honour of first discovering and publishing these facts. Quite a different supposition has hitherto prevailed respecting the motion of wedges and incline planes on the surface of water. "N. B.," impressed with the prevailing notion, says, "Mr. Lipscombe does not know, in all probability, that experiments have been made on the form of ships in which it has been shown that wedged-shaped bodies, such as those engraved in his tract (figs. 2, 3, 4, and the inclined planes) from the calculated resistance on which he deduces his conclusion, will go considerably faster in the direction *opposite* to that considered by him. It is recorded, on the experiments made by L'Abbé Bosaut, M. D'Alembert, and the Marquis de Condorcet, that a wedge-shaped body, which was made by a certain weight to travel 50 feet in 16 seconds, when the sharp end was first, went the same distance in 11¼ seconds when reversed." Conceiving these French experiments to be irresistible against me, "N. B." continues: "Is Mr. Lipscombe quite sure that he might not write stern for bow and bow for stern with advantage, so far as speed is concerned?"

When experimenting, I too observed that fig. 1 took less force to move it broad-end first than when point foremost; and I at once attributed it to the resistance caused by the water behind the flat stern, when in motion, being at a lower level than in front; and I took care in my subsequent experiments to try them upon a sufficiently large scale, in order that I might be enabled to give a stern of a length proportioned to the velocity I intended to give the wedges and incline planes. The result of these experiments I gave in my tract. I therein stated:

"When moving through water, a ship having her bows formed like either of the above-mentioned wedges, has the resistance she meets with lessened in proportion as her bows exceed in length her greatest *width*; for instance:

"If a flat-fronted body, as fig. 1, when moving through water, in the direction of its arrow, meets with a resistance of 8000 lbs., it will meet with only half the resistance, that is 4000 lbs., provided a wedge (see fig. 2) be added to its front, the same length as its greatest width; and only one-fourth the resistance, if the wedge be doubled in length (see fig. 3), and one-eighth, that is 1000 lbs., if four times the length (see fig. 4). Whereas the resistance of the water to the motion of a ship formed upon the principle of an incline plane, is lessened in proportion as the length of the incline plane exceeds its greatest *depth*; for instance, if a flat-fronted body, as fig. 5, when moving through water in the direction of its arrow, meets with a resistance of 8000 lbs, it will meet with only half the resistance, provided an incline plane be added to its front, the same length as its greatest depth (see fig. 6); and only one-fourth the resistance, if the length of that inclined plane be doubled, as fig. 7; and one-eighth if lengthened four times, as fig. 8; and one-sixteenth when lengthened eight times (see

Fig. 1.

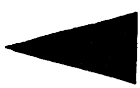


Fig. 2.

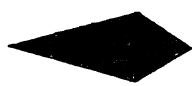


Fig. 3.

4

5 6 7

8 9

10

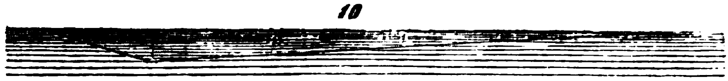


fig. 9); and only 1-32, that is 250 lbs., when lengthened sixteen times, as fig. 10. These inclined planes have the peculiar and valuable property of being less immersed the greater their velocity, owing to the reaction of the water—thereby exposing a less area to the resistance of the water.

"*The True Mode of Calculating the Resistance of Water to the motion of Wedges and Inclined Planes.*—The reason why the resistance of water to the motion of wedges and inclined planes is lessened in proportion as the length of the wedge exceeds its greatest *width*; and also in proportion as the length of an incline plane exceeds its greatest *depth*, is as follows:

"The resistance of the water met with by figs. 1, 2, 3, 4, is exactly the same. Fig. 1 has the whole of this resistance immediately before it; consequently, the full force of that resistance tends to drive it backwards. In fig. 2 this resistance is

divided into two equal forces—one tending to drive it backward, the other being uselessly exerted in tending to crush the sides of the wedge together. As we again double the length of the wedge, as fig. 3, the backward tendency is reduced to one-quarter the water resistance—the remaining three-quarters tending to crush the sides together. By again doubling the wedge, as fig. 4, the backward tendency is further reduced to one-eighth, the crushing tendency the remaining seven-eighths.

"The incline plane acts somewhat differently, as its resistance is lessened in proportion as its length exceeds its greatest depth.

"The resistance met with by figs. 5, 6, 7, 8, 9, 10, is exactly alike. Fig. 5 has the whole of this resistance immediately before it; consequently, the full force of that resistance tends to drive it backwards. In fig. 6 this resistance is divided into two equal forces; one, tending to drive the incline plane back; the other is expended in tending to lift it. In fig. 7 the backward tendency is one-quarter, the lifting tendency three-quarters. In fig. 8 the backward tendency is one-eighth, the lifting tendency seven-eighths. In fig. 9 the backward tendency one-sixteenth, the lifting tendency fifteen-sixteenths. In fig. 10, where the length of the incline plane is again doubled, the tendency of the water to drive it backward is 1-32 of its whole force against it—the lifting tendency, the remaining 31-32.

"Thus plainly showing that the longer we make the wedge and the incline plane, the less power the water has to drive them backward. In fact, we neutralise the resistance of the water by directing the force from the front of a moving body to its sides or bottom.

"*The incline plane is the long-sought-for form of least resistance, when moving on the surface of water.*—It moves great weights rapidly, with the same facility that wheels on land move weights placed on their axles—the longer the incline plane, the more easily it is moved. The more the diameter of the wheels exceeds the diameter of their axles, the more easily a weight resting upon them can be moved. Thus a man unable to lift a hundred-weight, may move several tons placed on a railway wagon."

The bows of the *America* are about three times longer than her greatest beam, and extend to a distance nearly two-thirds her entire length; according to "N. B.'s" ideas, and those of the Frenchmen quoted, her speed would be increased were she to go stern first. I would recommend "N. B." to go into a club-room, and make such an assertion to the yatching gentlemen there assembled.

The principle of the incline plane is most favourable for giving a ship plenty of beam, with the view to the obtainment of great natural stability. If we double the width of an incline plane, we simply *double* the resistance of the water to its onward motion—whereas, if we double the beam of an ordinary ship, we increase the resistance of the water to its onward motion *fourfold.*

As regards the stability of ships, "N. B." says, "Mr. Lipscombe talks of getting a large amount of buoyancy and stability, and for this purpose he has thought it advisable to construct his ship with a breadth equal to one-third of her length." "N. B." evidently labours under the error of supposing that I recommend all ships built upon my principle to have a beam one-third their length: but I recommend nothing of the kind. Upon referring again to my tract, I find the following words: "Being a small vessel, her greatest beam is represented as one-third her length, in order to obtain that necessary quality, stability. Ships of larger tonnage should have their length longer than this proportion, as the longer the incline plane, the less the resistance of water to its motion; hence, a ship ought to outstrip another shorter than herself." "N. B." ought to have considered that the engravings in my tract merely represented one instance of the application of my principle; and so long as the incline plane is kept in view, any form may be given to a ship depending upon the nature of her employment and the fancy of the owner and builder. And permit me to inform "N. B." that a ship constructed upon my plan, when in trim, will present the same appearance as the most sightly of existing ships.

I will now expose other errors "N. B." has fallen into. He says, "Why should Mr. Lipscombe go out of his way to increase a ship's stability so greatly, when she has already a sufficient amount for safety? Does he not know that it is possible to make a ship too stable? Some of those in Her Majesty's service have so great stiffness as to endanger the safety of the masts by the suddenness of the recoil. Mr. Lipscombe thinks he has proved that it is a flat underneath shape, and width combined with length, that give the greatest stability. I beg to assure him, a flat-underneath shape has nothing to do with the matter; it may be round, hollow, or irregular, with equal advantage." In reply, I beg to say, that in my tract I stated the hydraulic law relative to the influence of shape upon the stability of floating bodies to be as follows:

"If we immerse in water a globe of wood, containing 8 cubic feet, we shall find that it has no stability whatever—for, like a suspended wheel resting upon its axis,

the slightest pressure will cause it to roll—whereas, if we cut up that globe into pieces, one inch thick, and join them so as to make a close compact raft, 10 feet long by 9 feet 7 inches wide, this raft, although containing the same cubical contents of wood as the globe, would possess very great stability, and have no tendency to heel or roll. Were the raft 10 feet deep instead of one inch, the additional depth would not give it the slightest increase of stability; thus plainly proving that it is a flat-underneath shape, and width, combined with length, that give the greatest stability; and that no stability whatever is acquired by mere depth, unless the cargo of a ship be of greater specific gravity than water. The greater that specific gravity, and the deeper it be placed, the more stability a ship will have when sailing to windward, or in calm water; at other times, a rough sea gives her a quick, rolling motion."

"N. B." has so little knowledge of this law, and has read this portion of the tract with so little advantage to himself, as to have the stangely incorrect notion that the shape of the submerged portion of the hull of a ship does not influence its stability. With regard to the ships in Her Majesty's service having so much stiffness as to endanger the safety of the masts by the suddenness of the recoil, I beg to say, the masts are endangered, not by the beam of the ships, but by the absurd system of giving a deep hull to a ship, thereby giving every facility for the tremendous force of waves to act against it, and then placing heavy ballast in her as low as possible, in order to give her stiffness when going to windward. It is true it does give her stiffness in such a case; but when the wind is from other points, a heavy wave strikes against her deep upright hull, causing her to heel over; and when the force of the wave has passed, her ballast brings her quickly upright, and wave after wave serves her the same trick; the consequence is a quick rolling motion of the ship, entirely attributable to the bad form of the hull.

"N. B.," in conclusion, tells me that I have made such a violent plunge that I have been carried beyond my depth. In reply, I have merely to state, that being surprised at the numerous failures in the construction of ships, I studied the subject as an hydraulist, and having discovered where shipbuilders were wrong, and having found out what I conceive to be the right principle, I was of course necessitated to make a bold plunge, and am happy to say that many nautical gentlemen have called upon me, stating their belief in the correctness of my views; and I have no doubt that, a year hence, "N. B." will be of the same belief. A trial sea-boat of 50 tons will, I hope, be ready by the early part of April; a practical proof of my improvements will then be exhibited.

I am, Sir, yours, &c.,
FREDERICK LIPSCOMBE.

Temple Bar.

RAILWAY SIGNALS.

To the Editor of the Mechanics' Magazine.

SIR,—I would propose, as the means of the guard of a train to call the attention of the driver of the engine, either to draw up, go slow, fast, or backwards, to shoot from a steel cross-bow, or the ordinary long-bow, an arrow without feathers, and having fixed on its point a paper or other case, like the case of a squib or port-fire, and charged with about an ounce of Hall's rifle-powder. This charged case can be made to explode on falling to the ground, by friction or percussion, even though the ground be soft clay or grass land, because each signal has a cap with an iron bottom fitted on its point, so that each exploding signal carries its own iron front to fall on. The different words of command may be indicated by light-bells or stars contained within the case with the bursting-charge, such as a red, blue, or white-light or star. I can throw an arrow to the distance of two hundred yards from a long-bow of about fifty pounds strength, and as accuracy of flight is not required for this purpose, where a broad road is the target to be shot into, a much stronger bow may be used. In passing through a tunnel, I can cause the signal to explode, by shooting it in a slanting direction against the side-wall or roof. In packing these charged signals, the end into which the head of the arrow enters can be fixed into the iron-bottomed cap; no accident can then by any possibility occur, and when the signal is to be used, the cap is taken off its open end and fixed on its point, in the same manner as my percussion blasting cartridges are packed. A lady's thimble, with a small perforation in its front, makes a good head for the signal. The igniting appliance within the cap of the signal, may be formed with one or more percussion-caps or pellets, but I prefer using Bell's new gas round congreves. A balista, such as is used for projecting whale-harpoons, may be used with good effect, either for throwing these signals, or my exploding frictional cartridges or paper grenades, with the igniting string attached, high into the air. I can throw one of these cartridges, containing an ounce of powder and attached to the head of an arrow, from a long-bow of fifty pounds strength, sixty feet perpendicularly into the air. I saw about twenty years ago, in Edinburgh, a powerful steel cross-bow for throwing a

leaden bullet of two ounces, with a string attached to it, over the highest house in the city; this was to be used in cases of fire. The Belgians use similar cross-bows for shooting at the popinjay. In order to cause the lucifers to ignite by a slight pull of the string, the pressure or pinch of the twisted or burr-headed wire ought to be on the *primed* heads of the lucifers alone: if there is a pressure on the wooden shafts of the lucifers, it requires a strong pull to draw the wire through. A slight quill passing through the cap and the case of the signal, will keep the point of the thimble-head of the signal the third of an inch from the igniting appliance; the fall of the arrow from on high causes this quill-guard to double up, when instant ignition and explosion ensue.

I am, Sir, yours, &c.,

J. NORTON.

Victoria Hotel, Cork, Feb. 4, 1854.

ON THE DECIMAL SYSTEM.

To the Editor of the Mechanics' Magazine.

SIR,—At an influential meeting at Manchester, a short time back, Dr. Bowring is reported to have stated, after alluding to the very early practice of the decimal numeration by the Chinese, and the gratitude we possibly owe them, or, at any rate, the Arab race, for this, that "the fact was that Nature, or rather the God of Nature, had sent us all forth into the world with *decimal instincts;* the ten fingers that all possessed had taught even the rudest savages that from ten to twenty progression, which was, in fact, the great instrument of accomplishing those wondrous results which astronomy had reached."

Now, if the learned Doctor were to reconsider the matter, I fancy he would agree with me, that, so far from owing a debt of gratitude to the Arabs or Chinese, or whatever people it might have been that invented the decimal notation, we must attribute to them no small amount of confusion and difficulty in this all-important science. If the fellows had been satisfied to count (as, by the bye, the Doctor says they did) their *fingers*, all would have been well; but, unluckily, they included their thumbs; and by thus making eight into ten, what mischief have they not done? Why, almost all the rules of measure and weight of the civilized world have been attempts to escape from the dilemmas of the decimal numeration! and because it is *not* in accordance with the works of "Nature, or, rather the God of Nature."

Had our notation been in eighths instead of tenths, how great the ease and advantage of it! Its progressions, divisions, and parts representing decimals, would have been expressed in even numbers; whereas the decimal almost immediately breaks into odd numbers. In fact, it would have possessed the rudiments of geometry or the arithmetic of Nature, which now it does not. As to any aid the decimal system may have given to astronomy, or other investigations of nature, it seems to me the rather to be adverse to their requirements.

We must, indeed, make the best of the matter now; but it may, nevertheless, amuse and even instruct your arithmetical readers boldly to look this Arab "gift horse in the mouth." Let them try how well the more geometrical notation would tally with our practical, that is, tangible visible working necessities in measures, weights, coins, &c.; and I think they will, at all events, see no reason to *applaud* our barbarous early teachers. T. H.

London, Feb. 7, 1854.

PRIVY COUNCIL, FEB. 8, 1854.

JONES'S RICE STARCH PATENT.

(*Before the Right Honourable Baron Parke, the Right Honourable Pemberton Leigh, the Right Honourable the Judge of the Admiralty Court, and the Right Honourable Sir Edward Ryan.*)

THIS was an application made on behalf of the representatives of the late Orlando Jones, for an extension for a further term of 14 years for his patent for "Improvements in treating or operating on farinaceous matter to obtain starch and other products, and in the manufacture of starch."

The claim of the patentee was for the manufacture of starch, by subjecting rice or other farinaceous substances (rice being the main feature of the patent) to the action of a caustic alkaline solution, composed of real soda or real potash, lime and water, both in a whole state, and also after the rice was ground to flour. The application of the solution before the rice was ground was disclaimed in 1842, in consequence of a patent having been granted to one Thomas Wickham in 1824, for the use of such a solution in the manufacture of starch from rice, by subjecting the rice to the action of the solution before but not after the grinding. The petitioners applied for an extension of the portion of this invention (if any) left after the disclaimer, endeavouring to sustain the application of the solution referred to in the other stages of the operation, in spite of an adverse verdict recorded against them, in the action of Jones *v.* Berger, tried in 1843, by which the patentee was declared to be not the first and true inventor. It appears incredible

that, notwithstanding this verdict, and the most undoubted evidence of the want of novelty, the parties interested in the patent should have secured almost the entire monopoly of the manufacture of rice starch, and, to crown all, have now applied for a further extension of 14 years. Their Lordships having heard the opening speech of the petitioners' counsel, decided, without going into evidence, that there was not sufficient merit to warrant an extension, but that whatever merit there was, was due to another.

The application having been thus refused, the opposing counsel applied for the costs of the opposition, on the ground that there were no circumstances which warranted the application for extension of the term; and brought forward as evidence the record showing the verdict in Jones *v.* Berger. After considerable argument on this question, the costs of opposition having been so rarely awarded in cases before the Privy Council, their Lordships decided that the petitioners having shown no case to justify the application, the opposing parties deserved some remuneration for the trouble and expense incurred by them in opposing the renewal of a monopoly injurious to the public at large, and awarded £100 to be divided between the opposing parties, on account of their costs.

Mr. Atherton, Q.C., Mr. Montague Smith, Q.C., and Mr. Chance were counsel for the petitioners.

Mr. Serjeant Channel opposed, on behalf of Messrs. Irving, Son, and Jones, of Liverpool; and Sir Frederick Thesiger and Mr. Grove, Q.C., on behalf of Messrs. Wotherspoon, of Glasgow.

AUBÉ'S WOOL-LUBRICATING PATENT.

This was an application on behalf of the Directors of Price's Patent Candle Company, for the prolongation of Aubé's patent for "Improvements in the preparation of wool for the manufacture of woollen and other stuffs, and in the process of obtaining the materials to be used for that purpose," dated May 7, 1840, of which they had become the assignees. In carrying on the process, a large quantity of olive, or other vegetable oil of an expensive nature, was necessarily employed, and recourse was afterwards had to an offensive mode of removing it. The patentee discovered that in the manufacture of stearine candles, oleic acid was produced, the application of which to wool produced a better twist in the yarn and a stronger and firmer cloth than the former mode of preparing it, and by which the offensive materials before used were dispensed with. It had also a tendency to prevent spontaneous combustion. Many difficulties, however, were encountered in its introduction, and it was not until lately that its advantages were beginning to be appreciated.

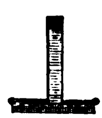
Sir F. Thesiger, having addressed the Council, was about to call witnesses in support of the application, when

Mr. Baron Parke said, that there having been a foreign patent which had already expired, their Lordships were of opinion that if they were to extend the English patent it would be invalid. The application, therefore, must be refused.

SCHÄFER'S TRAVELLING BAGS.

Fig. 1.

Fig. 3.



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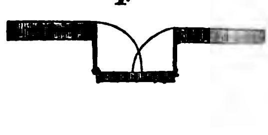
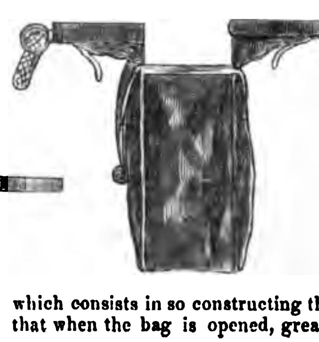


Fig. 2.



Messrs. Schäfer, of Brewer-street, have patented an improvement in travelling-bags, which consists in so constructing the frames that when the bag is opened, great facility

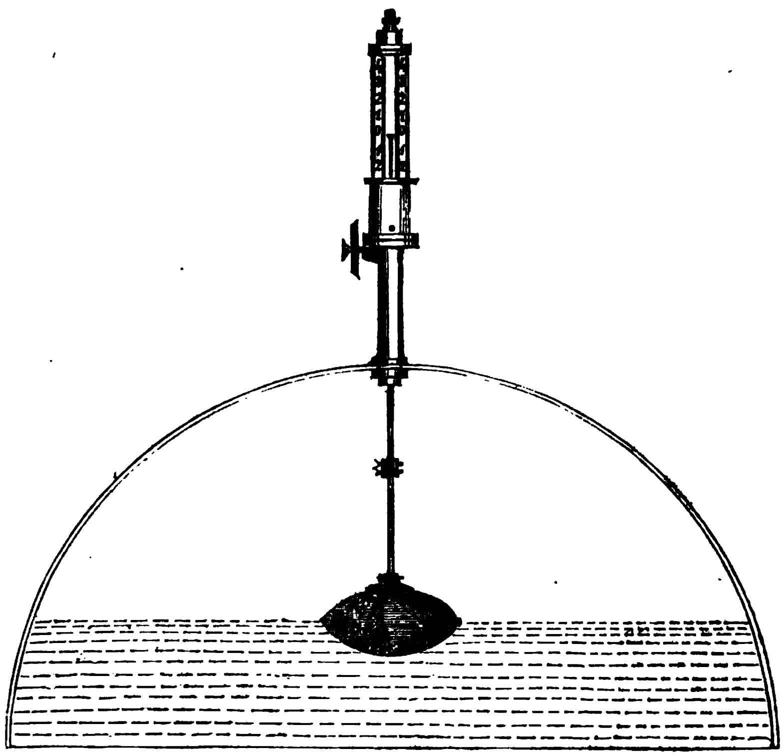
is afforded for packing, and when closed, the sides are to a great extent prevented from pressing on the articles placed in the bag, by which they are less liable to be soiled or otherwise injured.

Fig. 1 of the accompanying engravings represents an end view of a leather bag constructed according to their invention, and showing the bag closed. Fig. 2 is an end view of the bag open, and figs. 3 and 4 are respectively views of the frame, shown detached from the bag. The bag portion is attached to end frames, to which are hinged the elbow-shaped pieces (shown open in fig. 4) which support the upper frames, forming the mouth portion of the bag, which is opened and closed in the usual manner.

The utility of this construction will be seen without further description.

BITTEN'S SELF-ACTING WATER INDICATOR.

Mr. Bitten's is a simple and cheap contrivance for indicating the height of the water in steam boilers. In it no cocks or stuffing-boxes are employed, and the action is direct and self-acting. The accompanying engraving represents the instrument in position. A float resting on the water, inside the boiler, is attached by means of a connecting-rod to the indicating-rod, which passes up a glass graduated tube. The gauge stands upright on the top part of the boiler, into which it is screwed by a gas



thread. The connecting-rod between the float and the indicating-rod is cut off to suit the intended height of the water in the boiler. This apparatus will evidently indicate the smallest variations in the position of the water's surface. The glass tube will, of course, admit the steam, but will not be liabl3 to injury; if, however, by any accident it should be broken, it can be replaced in a few minutes, the steam being first shut off from it by means of the small wheel shown in the engraving.

Hand-book of Natural Philosophy and Astronomy. Third Course:—Meteorology—Astronomy. By Dr. Lardner. Walton and Maberly.

This and the preceding volumes of Dr. Lardner's Hand-book occupy a remarkable place in literature. While on the one hand they are examples of the extreme simplification which the statement of the laws by which natural phenomena are regulated is capable—on the other, they are illustrations of the care and method with which the true philosopher invariably treats the truths of science. In our opinion, the author has done very seasonable and lasting service by the publication of them. Nor is this our conviction alone, but one that we find very prevalent among those who are peculiarly identified with the interests of physical science in this country.

The increasing necessity which all classes of men are beginning to feel for further acquaintance with the principles of natural philosophy, creates the need of works that shall furnish the means of obtaining a comprehensive knowledge of the methods and results of science, apart from their abstruser relations, which cannot be studied without such preliminary mathematical culture as only a few can be expected to enjoy. It is to this need that Dr. Lardner so efficiently ministers. And in doing so, he serves the further most important purpose of preserving the public from pretenders, and, we might almost say, from charlatans. For it is very apparent to all observant persons, that, in the present day of unscrupulous speculation, many are assuming the functions of teachers of science who are utterly unqualified for the office. The publishers of numerous elementary works, and the platforms of the various mechanics', scientific, and other institutions of this country, furnish ready illustrations of this. Did no such writers as Dr. Lardner come to the rescue, by producing popular standard works, we should, ere long, be inundated with oceans of words from which it would be almost impossible to gather the pearls of scientific truth. It is, in our estimation, the highest praise we can possibly bestow upon these volumes to say that they are concise, exact, and plenary. The work, we may add, is uncommonly well got up. In this volume only there are thirty-seven superior lithographic plates, and upwards of one hundred excellent wood cuts. At the end of it an index is given, comprising the entire contents of the present and the two preceding volumes.

The following selections from the present volume are chosen as illustrative of the manner in which the author's elucidations are presented:

"*Insufficiency of Thermal Observations.*—To ascertain the laws which regulate the distribution of heat and the periodical vicissitudes of temperature on and below the surface of the earth, and in the superior strata of the atmosphere, is a problem of which the complete solution would require a collection of exact thermal observations; made not only in every part of the earth, but for a long series of years, not to say ages. Experimental research has not yet supplied such data. Observations on temperature, made at periods even so recent as those within which physical science has been cultivated with more or less ardour and success, were in general scattered and unconnected, and marked neither by system nor precision. It was only since the commencement of the present century that observations on terrestrial heat were accumulated in sufficient quantity, and directed with the skill and precision indispensable to render them the source from which the laws of temperature could be evolved. The experiments and observations of Humboldt, and the profound theoretical researches of Fourier and Laplace, supplied at once the nucleus of our present knowledge in this department of physics, and gave an impulse to inquiry, by which others have been carried forward and guided; so that if we do not yet possess all the data which sufficiently-extended and long-continued observation and experiment might afford, enough has at least been done to establish with certainty some general laws which prevail in the physics of heat, and to shadow forth others which future inquirers will confirm or modify."

"*Local variations of Temperature.*—The superficial temperature of the earth varies with the latitude, gradually decreasing in proceeding from the equator to the poles."

"It also varies with the elevation of the point of observation, decreasing in proceeding to heights above the level of the sea, and varying according to certain conditions

below that level; but in all cases increasing gradually for all depths below a certain stratum, at which the temperature is invariable."

"At a given latitude and given elevation the temperature varies with the character of the surface, according as the place of observation is on sea or land; and if on land, according to the nature, productions, and condition of the soil, and the accidents of the surface, such as its inclination or aspect."

"*Diurnal Thermometric Period.*—At a given place the temperature undergoes two principal periodic variations, *diurnal* and *annual.*"

"The temperature falling to a minimum at a certain moment near sunrise, augments till it attains a maximum at a certain moment after the sun has passed the meridian. The temperature then gradually falls until it returns to the minimum in the morning."

"This diurnal thermometric period varies with the latitude, the elevation of the place, the character of the surface, and with a great variety of local conditions, which not only affect the hours of the maximum, minimum, and mean temperatures, but also the difference between the maximum and minimum, or the extent of the variation."

And similarly with the annual thermometric period.

"*Mean Diurnal Temperature.*—This is a temperature so taken between the extremes that all those temperatures that are superior to it shall exceed it by exactly as much as those which are inferior to it shall fall short of it."

The method of obtaining the mean temperature of any period is to observe, at equal intervals of time sufficiently small, a series of temperatures, add these together, and divide by their number. It is usually found sufficiently exact to take the arithmetic mean of the maximum and minimum temperatures for the mean diurnal temperature. The mean temperature of the month is obtained from those of its days. That of the year from the mean temperatures of the months constituting it. The mean of a series of annual temperatures is called the temperature of the place at which the observations are made. Here is an explanation of isothermal lines and zones:

"In proceeding successively along the same meridian from the equator towards the pole, the mean temperature decreases generally, but not regularly nor uniformly. At some points it even happens that the mean temperature augments instead of decreasing. These irregularities are caused partly by the varying character of the surface over which the meridian passes, and partly by the atmospheric effects produced by the adjacent regions, and a multitude of other causes, local and accidental. As these causes of irregularity in the rate of decrease of the mean temperature, proceeding from the equator to the poles, are different upon different meridians, it is evident that the points of the meridians which surround the globe, at which the mean temperatures are equal, do not lose upon the parallel of latitude, as they would if the causes which affect the distribution of heat were free from all such irregularities and accidental influences."

"If, then, a series of points be taken upon all the meridians surrounding the globe, having the same mean temperature, the line upon which the points are placed is called an isothermal line."

"Each isothermal line is therefore characterised by the uniform mean temperature which prevails upon every part of it."

"*Isothermal Zones.*—The space included between two isothermal lines of given temperature is called an *isothermal zone.*"

"The northern hemisphere has been distributed in relation to its thermal condition into six zones, limited by the six isothermal lines, characterised by the mean temperatures, 86°, 74°, 69°, 59°, 50°, 41°, and 32°."

The annual and diurnal variations of temperature do not, however, affect the crust of the earth beyond a certain depth. As we descend, the maximum and minimum temperatures approach each other, and ultimately coincide, being then slightly greater than the mean temperature at the surface. The temperatures are unaffected by superficial variations at and below the stratum at which this coincidence takes place, and which is called the "stratum of invariable temperature." The depth of it naturally varies with the latitude, being greatest at the poles and least at the equator. In our latitude, it is from 80 feet to 100 feet. This relates to the solid portions of the earth, in which the changes of temperature are effected by conduction only.

Before speaking of the stratum of constant temperature of the ocean, we must notice the different manner in which the changes of fluid temperature are brought about, and the peculiar way in which the density of water varies with the temperature,

The general law of cooling is, that the density of the body continually increases as the temperature decreases—whereas in water, after it reaches the temperature of 38·8°, this law is reversed, and the density and temperature decrease together.

Again; in water very little heat is transmitted by conduction, the changes of temperature being produced by what Dr. Prout, in his Bridgewater Treatise, denominated *convection*, and which consists in the particles of the fluid changing place, in consequence of the tendency of those of which the specific gravity is the greatest, to travel always to the bottom.

As an exposition of the effects of these peculiarities upon the waters of the globe, the author says:

"If a large collection of water, such as an ocean, a sea, or a lake, be exposed to continued cold, so that its superficial stratum shall have its temperature constantly reduced, the following effects will be manifested:

"The superficial stratum falling in temperature will become heavier, volume for volume, than the strata below it, and will, therefore, sink, the inferior strata rising and taking its place. These, in their turn, being cooled, will sink; and in this manner a continual system of downward and upward currents will be maintained, by means of which the temperature of the entire mass of liquid will be continually equalized and rendered uniform from the surface to the bottom. This will continue so long as the superficial stratum is rendered heavier, volume for volume, than those below it, by being lowered in temperature. But the superficial stratum, and all the inferior strata, will at length be reduced to the uniform temperature of 38·8°. After this, the system of currents upwards and downwards will cease. The several strata will assume a state of repose. When the superficial stratum is reduced to a temperature lower than 38·8° (which is that of the maximum density of water), it will become lighter, volume for volume, instead of being heavier than the inferior strata. It will therefore float upon them. The stratum immediately below it, and in contact with it, will be reduced in temperature, but in a less degree; and, in like manner, a succession of strata, one below the other, to a certain depth, will be lowered in temperature by the cold of those above them; but each stratum being lighter than those below, will remain at rest, and no interchange by currents will take place between them. If water were a good conductor of heat, the cooling effects of the surface would extend downwards to a considerable depth. But water being, on the contrary, an extremely imperfect conductor, the effect of the superficial temperature will extend only to a very limited depth; and at and below that limit, the uniform temperature of 38·8°, that of the greatest density, will be maintained.

"This state of repose will continue until the superficial stratum falls to 32°, after which it will be congealed. When its surface is solidified, if it be still exposed to a cold lower than 32°, the temperature of the surface of the ice will continue to fall; and this reduced temperature will be propagated downward, diminishing, however, in degree, so as to reduce the temperature of the stratum on which the ice rests to 32°, and therefore to continue the process of congelation, and to thicken the ice.

"If ice were a good conductor of heat, this downward process of congelation would be continued indefinitely, and it would not be impossible that the entire mass of water from the surface to the bottom, whatever be the depth, might be solidified. Ice, however, is nearly as bad a conductor of heat as water, so that the superficial temperature can be propagated only to a very inconsiderable depth; and it is found, accordingly, that the crust of ice formed even on the surface of the polar seas, does not exceed the average thickness of 20 feet."

It is clear, therefore, that when once the lower strata of a sea have attained the temperature of maximum density, there can be no subsequent change produced in its temperature by any superficial disturbances; for the superior strata are necessarily lighter than they, whatever changes their temperatures may experience. This leads us then to the fact that, in every deep sea, there must be at some depth a stratum below which the temperature is that of maximum density, and is unaffected by variations in the superior strata. "At the lower latitudes the superior strata have a higher, at the higher latitudes a lower temperature, and, at a certain mean latitude, the stratum of invariable temperature coincides with the surface." Here then is observable a striking distinction between the stratum of constant temperature in the fluid and solid portions of the earth, in the latter of which it is uniformly situated at a distance more or less great below the surface, while in the

former, as we have just seen, it coincides with the surface at that isothermal line of which the temperature is 38·8°. In point of fact, this stratum would not occupy an invariable position at its point of contact with the surface, but, like the temperature of 38·8° itself, would perform oscillations on each side of the isothermal line depending upon annual or other superficial variations. It appears to us that, upon the whole, it would be better to define the stratum of invariable temperature as the envelope of the different positions of the above varying surface, although there is no doubt that, for ordinary purposes, that usually adopted by meteorologists is sufficiently exact.

As we intend in a future paper to notice the astronomical section of this volume, we shall conclude for the present by quoting Dr. Lardner's summary of his chapter on Terrestrial Heat, founded on the researches of M. Pouillet:

"1st. That the sun supplies the earth annually with as much heat as would liquify 100 feet thick of ice covering the entire globe.

"2nd. That the celestial spaces supply as much as would liquify 85 feet thick.

"3rd. That 40 per cent. of the one and the other supply is absorbed by the atmosphere, and 60 per cent. received by the earth.

"4th. That of the heat radiated by the earth 90 per cent. is intercepted by the atmosphere, and 10 per cent. dispersed in space.

"5th. That the heat evolved on the surface of the sun in a day would liquify a shell of ice 10½ miles thick enveloping the sun, and the intensity of the solar fire is 7 times greater than that of the fiercest blast-furnace.

"6th. That the temperature of space outside the atmosphere of the earth is 224° Fahr., or 256° below that of melting ice.

"7th. That the solar heat alone constitutes only two-thirds of the entire quantity of heat supplied to the earth to repair its thermal losses by terrestrial radiation; and that without the heat supplied by stellar radiation, the temperature of the earth would fall to a point which would be incompatible with organic life."

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BRAE, ANDREW EDMUND. *A method of communicating signals from one part of a railway-train to another.* Patent dated January 24, 1853. (No. 181.)

This invention relates to a method of signalising by means of tubes; the following will be sufficient to indicate its principal feature:

The inventor places along the under framework, or in any other suitable situation, of each carriage in a train, a tube extending throughout the length of the carriage, and projecting at its ends. He supports this tube upon collars or bearings, in which it is free to revolve, but secured from longitudinal motion. Into either or both extremities of the said tube he introduces a portion of an arm or plunger, of a suitable size to enter into and slide freely within it, but prevented by any obvious means from revolving or twisting round independently of the tube. To the other extremity of the plunger he attaches one or more of Hooke's universal joints, and to these, again, he attaches other arms, or bars, having their extremities formed into one member of a peculiar coupling or junction, and thus connects the apparatus from carriage to carriage.

COUSENS, ROBERT BOOTY, of Halliford-street, Islington, Middlesex, engineer. *Improvements in the manufacture of casks or wooden vessels.* Patent dated June 7, 1853. (No. 1401.)

The two peculiar features of this invention are—1. Supporting the stave while it is being cut upon three rollers, or upon two, one of which has a double flange, so that it is sustained on three points only. And, 2. Regulating the spread of the cutting saws by means of a model stave placed beneath the stave being cut, and caused to move along with it.

HART, PHILIP, of Brierley-hill, Stafford, agent. *Improvements in the manufacture of coke.* Patent dated July 1, 1853. (No. 1584.)

The inventor takes coal, and slack of coal, of any quality (except stone-coal, which will not coke to advantage), and having carefully set it up in a heap, or pile of round or oblong shape, covers it all over with fine slack, and then blacks or covers this with fine ashes, or breeze, up to the shoulder of the heap or pile; and that part of the heap which extends from the shoulder over the top, he covers with small coke embers upon the fine slack, as the quality of the coal may require, so as to exclude as much as possible of the atmospheric air from the coal, and thereby pre-

vent its action upon the coal while the smoke and other volatile matter contained therein is being expelled, before general combustion is allowed to take place.

MEYER, HENRY, of Manchester, Lancaster, engineer. *Certain improvements in looms for weaving.* Patent dated July 5, 1853. (No. 1598.)

Claims.—1. An improved combination of machinery for raising and lowering the drop-boxes of looms, having a double drop-box at each end of the lay. And, 2. An improved combination of machinery for stopping looms in the absence of the weft, and the parts in combination therewith, for disengaging the stop-motion on one side of the loom, when the shuttles are on the other side.

POLLARD, NATHAN, overlooker, of Bowling, near Bradford, York. *An improvement in machinery for drawing wool and other staple.* Patent dated July 5, 1853. (No. 1602).

The inventor employs a rotating-circular comb, or porcupine roller or rollers, set between the working comb, or comb head, and the drawing-rollers. When this comb or roller is used in connection with loose sliding combs, it is mounted on a stud pin carried by the frame of the comb slide, or the drawing head, and as it revolves its teeth strike into the staple on the combs. Rotary motion is imparted to it, and it is thereby made to penetrate the staple (as it is brought by the working combs to a level with the drawing-off rollers), and hold back the noils and trash, while the finished top is taken from the working combs by the drawing-off rollers.

*** The five preceding specifications have been filed since the expiration of the six months from the dates of the several provisional protections, by special permission of the Lord Chancellor. The grounds on which the times for filing them were extended were, that the delay was in every case occasioned either by unsuccessful opposition, or by the late heavy falls of snow, which interfered with the traffic on some of the lines of railway.

WARDER, ALFRED WILLIAM, of Sydney-street, Brompton. *Improvements in gas-stoves.* Patent dated July 26, 1853. (No. 1763.)

This invention consists in forming a gas-stove of earthenware or other suitable material, by preference of a cylindrical exterior form. The interior chamber is divided into three compartments, by means of two partitions; the centre compartment is open from bottom to top, so that the external air may pass from below upward, become heated, and then pass into the apartment. The two other compartments are connected together at the upper part of the apparatus by tubular passages. Gas is supplied to one of the compartments, and air is allowed to flow in freely through the products, passing through into the third compartment, and away by a suitable passage into a chimney or flue.

ARDING, FRANCIS, of the Albert Ironworks, Uxbridge, Middlesex, agricultural implement manufacturer. *Improvements in threshing-machines.* Patent dated July 27, 1853. (No. 1764.)

This invention relates, firstly, to the substitution of triangular frames for the support of the body of the machine, by which the bulk of its weight is brought within the base, and great solidity is thereby obtained with less tendency to vibration or oscillation. These end-frames may be formed of wood or other material, of the shape of a triangle or letter A, with cast-iron headpieces, forming the top in which the shaft of the drum is supported. The inventor proposes to form the straw-shaker as follows:—the bed of it is to be formed of wood or other suitable material, with a succession of lines of shafts fitted with cams; these shafts have a rotary motion, and the straw, falling upon the first of them, is carried forward to the next, and so on to the end of the series. The space between the lines of the arms is filled in with perforated zinc, wire gauze, or other similar material, so as to allow the grain to fall through into troughs placed below, whilst the straw is conveyed along the bed of the shaker.

KNOWLES, JOHN, of Manchester, manager. *Certain improvements in looms for weaving.* Patent dated July 27, 1853. (No. 1765.)

The inventor describes and claims a combination of machinery for moving up and down the drop-boxes of looms working with two or more shuttles.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury. *Certain improvements in the manufacture of tiles for roofing.* (A communication.) Patent dated July 27, 1853. (No. 1766.)

Claim.—The construction of metal, clay, glass, or gutta percha tiles for roofing, with corrugatious and overlapping sides.

BEAUJEU, ANGE LOUIS DU TEMPLE DE, of Paris, France, gentleman. *Improvements in rotary engines.* Patent dated July 27, 1853. (No. 1767.)

Claims.—1. "The construction of apparatus for producing in a close vessel a continuous current of liquid in the same direction, by the pressure of the steam of water or other liquids, or compressed air, or other elastic gases, in a cold or heated state, acting upon water directly or indirectly by means of a fatty non-evaporating body, such as rectified

sperm oil, for the working of water-wheels, or turbines, reaction wheels, pumps, and other similar machines." 2. Mechanical arrangements for working the distributing steam valves of the said apparatus, by the action of the turbine, or other hydraulic machine to which its motion is applied, as hereinbefore described. 3. The construction of a turbine with inverted paddles, for the application of the said current to forward and backward propulsion.

HERRING, EDWARD, of Southwark, Surrey, manufacturing chemist. *Improvements in the manufacture of sulphate of quinine.* Patent dated July 28, 1853. (No. 1768.)

The inventor describes and claims a method of manufacturing sulphate of quinine, the characteristic feature of which method is that the employment of alcohol in the process is dispensed with.

CUMMINS, CHARLES, of Leadenhall-street, London, chronometer-maker. *Improving clock-escapements.* Patent dated July 28, 1853. (No. 1769.)

This invention consists in constructing certain clock-escapements, one of which is composed of a wheel with a plain rim, upon the plane of which rim there are two circles formed of pins, each circle containing a number of pins equivalent to the quantity of teeth required in ordinary clock-escapements.

FORSTER, THOMAS, of Streatham, Surrey. *Improvements in the manufacture of boots and shoes.* Patent dated July 28, 1853. (No. 1771.)

This invention consists—1. In lining the interior of boots and shoes with India-rubber, or compounds thereof. 2. In coating the exterior surfaces of leather boots and shoes with India-rubber, or compounds thereof, and in then japanning the outer surfaces.

BRODIE, BENJAMIN COLLINS, junior, of Albert-road, Regent's-park, Middlesex. *Improvements in treating or preparing black lead.* Patent dated July 28, 1853. (No. 1772.)

The object of this invention is to obtain black lead in a very fine state of division. For this purpose the black lead is to be broken down to coarse particles, and then subjected to heat with acid, a mixture of sulphuric and chromic acid being preferred. As much as possible of the acid is then drained and pressed out, the remainder being washed out with water. The black lead is then dried, and subjected to a red heat.

DETHIER, THEODORE, of Pimlico, Middlesex, cabinet maker. *An improved machine for mortising, drilling, and boring.* Patent dated July 29, 1853. (No. 1773.)

Claims.—1. The instantaneous reversing of the mortise tool or chisel, so as to cut right and left without stopping the machine. 2. A moveable adjusting rest, and rising and falling centre frame. 3. Drilling and boring with a fixed drill or borer by means of the above moveable adjusting rest, on a rising and falling centre-frame, while the drill or borer remains at the same level.

JARRETT, GRIFFITH, of London. *Improvements in machinery or apparatus for stamping or printing coloured surfaces.* Patent dated July 29, 1853. (No. 1774.)

Claims.—1. The construction and employment of a self-feeding, colouring, and stamping press, as described. 2. The application of chemically-prepared paper or other material for obtaining coloured impressions.

MCCONNELL, JAMES EDWARD, of Wolverton, Buckingham, civil engineer. *Improvements in steam-engines and boilers for marine purposes.* Patent dated July 29, 1853. (No. 1775.)

In Mr. McConnell's invention a set of cross partitions are introduced into the water space above the fire-box, for the purpose of preventing the rolling of the ship from sending all the water into any particular part of the boiler, so that it is constantly kept well spread over the available heating surface. For the prevention of deposit and incrustation, vessels which can be detached at pleasure, of suitable form, are placed under the barrels of the boilers to receive the deposited or precipitated matter from the water, or the deposit can be withdrawn by a blow-off cock, or by other suitable means. Separate or additional fire-doors are also introduced into the boilers beneath the fire-boxes through the water spaces for the admission of atmospheric air, to render the combustion more complete.

MACKAY, JAMES, of Aigburth, near Liverpool, Lancaster, merchant. *Improved apparatus for propelling vessels.* Patent dated July 29, 1853. (No. 1776.)

Mr. Mackay's invention consists in forming a cylindrical projection of the same diameter as the boss of the propeller, which projection falls away and is lost in the swell of the hull of the vessel. It is virtually a forward prolongation of the boss of the propeller, "and prevents," says the inventor, "the water which is displaced by the hull of the vessel from closing in and pressing upon the forward end of the boss." In forming the blades of his improved propeller he employs two semicircular plates. "These blades," says he, "I prefer to place eccentrically upon their boss, as I thereby cause the forward end of the propeller to describe a circle of a larger diameter than the hinder end, the effect of which arrangement is that the propelling power of each

blade will be great immediately it enters the water, and that the lift of back-water will be inconsiderable." It is difficult to determine what is meant by the propelling power of each blade of a *submerged propeller* being great "immediately it enters the water."

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improvements in depositing metals or alloys of metals.* (A communication.) Patent dated July 29, 1853. (No. 1777.)

As an illustration of this invention we take the patentee's method of depositing a coating of brass by galvanic agency, in which he employs the following;—1. A solution of the double chloride of zinc and ammonia. 2. A solution of the double chloride of zinc and potassium. 3. A solution of the double chloride of zinc and sodium. 4. A solution of the double acetate of zinc and ammonia. 5. A solution of the double acetate of zinc and potassium. 6. A solution of the acetate of zinc and soda. 7. A saturated solution of carbonate of zinc and carbonate of ammonia. 8. A solution of the double tartrate of zinc and of potash, soda, or ammonia. (To one thousand parts of the solution of tartrate of zinc, indicating three degrees on the salinometer, thirty parts of hydrochlorate of ammonia and eighty parts of hydrochloric acid must be added.) 9. A solution of citrate of zinc rendered soluble by an excess of citric acid. 10. A solution of tartrate of zinc in potash or soda.

With each of the above solutions an analogous solution of copper must be mixed in the proportion suitable for obtaining the required depth of colour.

WILD, WILLIAM, of Salford, Lancaster, iron-moulder. *Improvements in machinery or apparatus for covering rollers used in the manufacture of cotton and other textile materials, with leather, cloth, or other substances.* Patent dated July 29, 1853. (No. 1778.)

In this invention material for covering or coating rollers being cut into strips, is wound upon a creel placed above the machine, and from this the strips are passed down and conducted between a series of long feeding-rollers, extending longitudinally through the machine and mounted in slotted standards, being kept pressed together by set-screws. These feeding-rollers have interrupted rotary motions, in order to feed into the machine certain lengths of the strips of leather at intervals, sufficient at each movement to bring into operation a length of the strip equal to the circumference of the roller intended to be coated or covered.

HENLEY, WILLIAM THOMAS, of St. John-street-road, London, telegraph engineer. *Improvements in modes of protecting wires for telegraphs.* Patent dated July 30, 1853. (No. 1779.)

This invention consists in placing electric telegraph wires in an iron trough, so constructed as to be suitable for preserving them from injury, whether placed above or below the surface of the earth or submerged, and with covers capable of being fitted easily and efficiently.

DOUGLAS, GEORGE KATZ, of Chester, engineer. *Certain improvements in the permanent way of railways.* Patent dated July 30, 1853. (No. 1780.)

In this invention the chair is made with two pairs of jaws, which are cast together in the usual manner, and are sufficiently wide apart at the top to admit the rail. Between the jaws and the body of the rail is a plate, enlarged between the jaws, in order to strengthen it, and another plate is held in contact with the other side of the rails by vertical wedges. These plates and wedges the inventor prefers to make of cast-iron, but they may be made of wood. When the wedge is of wood, it is requisite to have a hole in the chair, through which the wedge can be forced when the rail has to be removed.

COOK, WILLIAM WOODS, of Bolton Lancaster, muslin manufacturer. *Improvements in the manufacture of woven fabrics, and in the apparatus employed therein.* Patent dated July 30, 1853. (No. 1781.)

This invention consists in a peculiar arrangement of the order in which the cards are cut and laced, for producing a welted or corded ground between the figures of a design, and in the manner of working the Jacquard machine after the cut and laced cards are applied to it.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *An improved mode of producing an electric current.* (A communication.) Patent dated July 30, 1853. (No. 1785.)

This electric battery is composed of twenty-eight elements, each being formed of a trough, an amalgamated zinc cylinder, and a porous vessel containing one or more charcoal elements, disposed within each other in the usual manner. The charcoal may have the form of a cylinder, and a set of three of them, or a system of plates, united at the top, may be employed, in order to multiply the surface and increase electric action. The troughs may be of a flat or square shape in lieu of round. The twenty-eight troughs are placed in a long outer casing, divided into two principal compartments, which are subdivided into fourteen cells, to receive the several elements. These cells are open at top and bottom, and have two small cross-pieces set

at the bottom part for receiving the troughs. The casing is supported by a trestle at each end, being set at half their height from the ground. Set screws on the feet of the trestle serve to put them on a level, and on the top of the trestle two wooden axes are set, extending from one end to the other and turning on pivots.

SMEETON, JOHN, of Limehouse, Middlesex, export outfitter, &c. *Improvements in the manufacture of tablets and dial-plates, applicable to showing the distance of carriages travelling.* Patent dated July 30, 1853. (No. 1788.)

The inventor forms a blank or ring of metal of the required shape, and then by drawing the same through a set of steel or any metal tools known as drawing-through tools, forms a curve or rim on the edge of it. He then places a printed satin, parchment, paper, or any elastic fabric over the metal plate, and applies a die and press, by means of which both become united. Eyelet holes of metal, ivory, pearl, or bone are then inserted to admit of the centre pinion for the hands to work upon, and to receive the key for winding, and the tablet or dial-plate is then complete.

GRAY, JOHN, of Rotherhithe, Surrey, engineer. *Improved apparatus for consuming smoke.* Patent dated August 1, 1853. (No. 1790.)

The constructing the bridges or back parts of furnaces with two passages, or sets of passages communicating with each other, and with a common chamber or passage for the admission of air.

SCHÄFER, PHILIPP, and FREDERICK SCHÄFER, of Brewer-street, Middlesex, manufacturers. *An improvement in travelling bags.* Patent dated August 1, 1853. (No. 1791.)

A description of this invention is given in a former part of the present Number.

PERRING, JOHN SHAE, of Bury, Lancaster, civil engineer. *Improvements in the permanent way of railways.* Patent dated August 1, 1853. (No. 1793.)

Claim.—"So shaping or constructing the rails of points or switches, that they may be used either side uppermost."

LISTER, SAMUEL, of Manningham, York. *Improvements in machinery for washing wool and hair.* Patent dated August 1, 1853. (No. 1794.)

These improvements in washing machinery consist in covering washing rollers with gutta percha, or unvulcanized caoutchouc, or similar material, either in combination with other substances or otherwise. Also in causing wool or hair to pass through a washing bowl, by means of a trough or spout, placed inside of a long washing bowl.

POPE, AUGUSTUS RUSSELL, of Massachusetts, United States. *A new and useful or improved electro-magnetic alarm apparatus, to be applied to a door or window or both, of a dwelling-house or other building, for the purpose of giving an alarm in case of an attempt to open said door or window.* Patent dated August 1, 1853. (No. 1795.)

Claims.—1. The combination of a moveable or vibrating armature and a spring circuit breaker, with a bell hammer applied and used for the purpose of ringing a bell. 2. The combination of an automatic or self-acting key, circuit wires leading therefrom, an electric battery or other generator of electricity, an electro-magnet, bell hammer, armature, and a circuit breaker, when applied and used in connection with a door or window for the purpose of sounding an alarm.

GRIFFITHS, ROBERT, of Mornington-road, Regent's-park, Middlesex. *Improvements in the manufacture of rivets and bolts.* Patent dated August 1, 1853. (No. 1796.)

Claim.—The making of bolts or rivets by rolling them separately in the direction of their circumferences from pieces of iron of suitable lengths.

MAY, CHARLES, of Great George-street, Westminster. *Improvements in the manufacture of bricks.* Patent dated August 1, 1853. (No. 1797.)

This invention consists in causing the brick-earth to be expressed through orifices or in moulds by hydraulic pressure. The inventor prefers that the water should be constantly pumped into a vessel kept subjected to the pressure required, being used at intervals for pressing the brick-earth through the moulding orifices. The bricks are subsequently pressed in moulds with pins or plugs, to enter the several perforations to improve the form and give compactness to the bricks.

HOLME, RICHARD, of Kingston-upon-Hull, gas engineer. *Improvements in the manufacture of gas.* Patent dated August 1, 1853. (No. 1798.)

This invention consists in constructing retorts with enlargements or chambers at the upper parts, so that the gas, as it is evolved, instead of passing away out of the retorts by rising-pipes as heretofore, is received into the upper parts or gas-chambers of the retorts, and is thence conveyed to be purified and to be conducted to the gasometer.

GRIFFITHS, JOHN, of Steapaside Saunderfoot, near Tenby, Pembroke, South Wales, engineer. *Certain improvements in steam-engines.* Patent dated August 2, 1853. (No. 1801.)

This invention consists in conveying one portion of the off-steam of high pressure engines into a receiver to be again used,

and the remainder to the condensor, in order to obtain a better vacuum, and to use the steam more advantageously.

PERKS, junior, WILLIAM, of Birmingham, Warwick, glass and lead merchant. *A new or improved tap for drawing off liquids.* Patent dated August 2, 1853. (No. 1802.)

This invention relates to taps which are opened and closed by a valve raised from its seat by the rotation of a screw.

Claim.—The use of a tube of vulcanised caoutchouc, or other sufficiently flexible and waterproof material, fastened at one end to the valve and at the other to the tap.

COMPLETE SPECIFICATIONS FILED WITH APPLICATIONS.

SCHÖNHERR, CHRETIEN GUILLAUME, of Chemnitz, Saxony, mechanical engineer. *Improvements in bobbin machines.* Patent dated December 31, 1853. (No. 3032.)

This machine is intended to work more correctly and regularly than can be effected by manual labour, and does not injure the quality of the yarn. The bobbins are independent of each other; that is, they each regulate its own yarn-guide, so that each bobbin may be filled apart or separate with any other quality of yarn, without changing any other part of the machine. Again, the bobbins may be wound partly half full and partly full, and may in this manner be replaced by new or empty ones, without its being necessary to stop the machine, which continues to work without intermission, and without making any defective bobbins. As soon as any one of the bobbins is completely full, it detaches itself by the movement of a stop-rod, and ceases to move. The yarn to be wound receives the tension necessary to form a compact and regular bobbin, without friction upon the yarn, and consequently without injury.

WATSON, HENRY, of High-bridge, Newcastle-upon-Tyne. *Improvements in water-closets.* Patent dated January 21, 1854. (No. 147.)

The object of this invention is to simplify the arrangement of apparatus for moving the pans or valves of water-closets, and for supplying water to them, and consists in combining the axis of the pan or valve of the water-closet with the plug or valve of the water-supply pipe, and using a box at the end of that pipe.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

STANFORD, JOHN FORDHAM, of Arundel-street, Middlesex. *An improvement in the method of draining dwelling houses, and open and enclosed spaces in cities and towns where sewers and drains are now, or may be hereafter constructed.* Patent dated July 28, 1853. (No. 1770.)

This invention consists in an apparatus or vessel having pipes attached to it, and a division formed in it, fitted with a floating plug or stopper, by means of which water is admitted to pass only one way; and in connecting this apparatus with the common dain pipes sunk in channels in the ground, and filling the channels with rubble.

AMBLER, GEORGE, of Settle, York, mechanist. *Certain improvements in machinery for preparing for spinning cotton, wool, and other fibrous substances.* Patent dated July 30, 1853. (No. 1782.)

Mr. Ambler's improved machinery is for forming the lap; the cloth is coiled round a roller by simple contact with one or more other rollers, to which a revolving motion is communicated by suitable gearing. The cloth, as it passes to be coiled, traverses along a flat bed, and the attendant spreads over it continuously, and in an even layer, the requisite quantity of fibrous material.

RAMSAY, PATRICK, of Glasgow, Lanark, North Britain, water-proof cloth-maker. *Improvements in the construction of tents.* Patent dated July 30, 1853. (No. 1783.)

According to this invention, any convenient number of wooden or iron posts are set up in the ground at convenient distances apart. To the tops of these posts, iron or other rods are attached by means of nuts and screws, or in any other convenient manner, and these rods are united in a point in the centre, in a manner similar to the frame work of an umbrella, and presenting a pyramidal form when the tent is circular; but when it is of an oblong shape, the rods will run to a central rod like the ridge of an ordinary roof. The tops of the posts are also connected together by rods. This framework is covered with cotton, cloth, canvas, or other suitable material.

*** No. 1784 has not been allowed.

BUCHANAN, JOHN, of Leamington Priors, Warwick, gentleman. *Improvements in propelling vessels.* Patent dated August 1, 1853. (No. 1786.)

The inventor describes a propeller which has the advantages—1. Of being capable of having its blades feathered and fixed in any convenient position. 2. Of being constructed so that it may be placed either in the after dead-wood of the vessel, in the rudder, or abaft the rudder: and if placed in or abaft the rudder, it assumes the same angle as the rudder, both being moved by a double lever connected with the steering-wheel, and may be lowered with the rudder, and again put into gear with the engine.

CADELL, HENRY, of Dalkeith, Scotland, mining engineer. *A reaping-machine.* Patent dated August 1, 1853. (No. 1787.)

This invention consists in the use of a machine, in which a series of cutters or scythes of a crescent shape are attached to a cylindrical frame or drum, which is made to revolve with the cutters, which pass over a set of fixed teeth of a diamond-pointed shape, attached to the under frame of the machine. Each moving cutter is surmounted by a rake of two or more prongs, which is hung upon pivots attached to the side of the drum. This rake, by means of a spanner acting upon a cam fixed to the upper frame of the machine, is made to stand out and receive the corn in front, as it is cut, and carry it to one side of the machine; it is then made to fall back by means of a recess in the cam, and to discharge the corn. The machine is driven by horses, by means of a pole behind.

TRACY, JAMES PUDNEY, of Salisbury, Wilts, and JOHN HART TRACY, of Old-street, Middlesex, engineer. *Improvements in cutting, reaping, and gathering-machines.* Patent dated August 1, 1852. (No. 1792.)

This machine consists of a frame depending from an axle supported by two main-wheels. The cutter consists of a series of segments of circles, serrated at their edges, and bolted or fixed all round the circumference of a wheel placed horizontally in front of the main supporting-wheels. Rotary motion is communicated to the cutter-wheel by means of a chain or strap driven by a chain-wheel or drum, which receives its motion from a bevel-wheel fitted on the axle of the main wheels. The gatherer consists of two, three, or more horizontal wheels, which are placed over the cutter-wheel, and the spokes of which project beyond the front and point of the sides of the frame. A semicircular finger-plate is bolted to the framework immediately over the cutter-wheel. The fingers hold the corn or other crop while being cut by the cutters; the gathering-wheels then take hold of the corn and deposit it at the side of the machine, clear of the main supporting-wheels.

VAILE, HENRY PURSER, of Claydon Farm, Ashchurch, near Tewkesbury, farmer. *Improvements in reaping-machines.* Patent dated August 1, 1853. (No. 1799.)

This invention consists in applying a series of circular rotatory cutters, with serrated edges by preference, in such manner, that they rotate in different planes, and so as to overlap each other. These cutters act independently of each other, and are driven by bands or suitable gearing; and in order to guide the crop to the cutters, fixed projections or fingers placed in advance of the cutters are used.

BOTHAMS, JOHN, of Gravesend, Kent, gentleman. *Improvements in the manufacture of wheel-tyres for locomotive engines and other carriages.* Patent dated August 2, 1853. (No. 1800.)

To form a strong tyre the inventor takes a bar of suitable dimensions and winds it in the form of a helix, of a sufficient breadth to form the tyre; it is then heated and welded together in a solid mass, and afterwards rolled or hammered to the proper size and shape.

PROVISIONAL PROTECTIONS.

Dated October 25, 1853.

2468. Marcus Davis, of Cloudesley-square, Islington, Middlesex. Improvements in the treatment of fibrous materials other than flax and hemp. A communication.

Dated November 22, 1853.

2707. Edward Briggs, of the Castleton Mills, near Rochdale, Lancaster, manufacturer. Improvements in weaving and manufacturing raised pile fabrics, and in machinery employed therein.

Dated November 28, 1853.

2773. James Lord, of Farnworth, Lancaster, manager. Improvements in the manufacture of certain articles for ladies' under clothing, and in fabrics for the same.

Dated December 29, 1853.

3019. James William Crossley, of Brighouse, Halifax, York, dyer and stuff-finisher. Improvements in the production of surface finish to certain descriptions of fabrics composed of worsted, cotton, or silk, or combinations thereof.

Dated December 30, 1853.

3023. William Pickstone, of Radcliffe, Lancaster, manufacturer, and John Booth, of Pilkington, Lancaster, manager. Improvements in looms for weaving.

Dated December 31, 1853.

3039. Julian Bernard, of Regent-street, Middlesex, gentleman. Improvements in stiching and ornamenting various materials, and in machinery and apparatus connected therewith.

Dated January 5, 1854.

27. John Mason, of Rochdale, Lancaster, machinist, and Leonard Kaberry, of Rochdale aforesaid, manager. Improvements in machinery or apparatus for preparing cotton, wool, and other fibrous materials for spinning.

Dated January 12, 1854.

81. Leon Joseph Anger, mechanician, of Paris, France. Improvements in the manufacture of metallic tubing.

Dated January 13, 1854.

87. William Eassie, of Gloucester, railway contractor. Improvements in trucks used on railways.

Dated January 14, 1854.

92. James Newman, of Birmingham, Warwick, jeweller, and Henry Jenkins, of Birmingham aforesaid, die-sinker, stamper, and piercer. Improvements in the manufacture of spoons, table-forks, and other articles.

Dated January 17, 1854.

107. William Crosskill, of Beverley, York, civil engineer. An improvement in the construction of

carriage wheels to run on railways and ordinary roads.

109. Henry Holland, of Birmingham, Warwick, umbrella and parasol-manufacturer. Certain improvements in the construction of parts of umbrellas and parasols.

111. Henry Corlett, of Summer-hill, Dublin, Esq. Improvements in springs for railway and other carriages and vehicles.

113. Bevan George Sloper, of London, civil engineer. Improvements in machinery or apparatus for separating gold from earthy matters.

Dated January 18, 1854.

115. Edward Lord, of Todmorden, York, machine-maker. Certain improvements in looms for weaving.

117. Charles Staunton Cahill, of Greenwich, Kent, and Annadown, Galway, Ireland, Esq. Improvements in submarine, subterranean, and other electric and magnetic telegraphs, and in insulating, laying down, joining, and covering the same.

119. Walter Greenshields, of Edinburgh, Midlothian, North Britain, manager. Improvements in chenille fabrics.

121. Edmund Sharpe, of Swadlincote Potteries, near Burton-on-Trent. Improvements in the apparatus used for sifting clay.

125. Jean Pierre Bourquin, of Newman-street, Middlesex, dealer in photographic apparatus. Improvements in or applicable to troughs or vessels for holding liquid substances required in the art of photography.

Dated January 19, 1854.

129. John Norton, of Cork, Ireland, Esq. Improvements in effecting communications between the different parts of railway trains.

131. Heloise Guyon, of Paris, France, widow. Improvements in the manufacture of bread.

132. Henry Brownentt, of Liverpool, Lancaster, merchant. Treating scrap and waste iron so as to render the same more readily available in the manufacture of iron.

133. Francis Parkes, of Sutton Coldfield, Warwick, edge-tool and agricultural-implement maker. A mode or method of fixing tools and implements in helves or handles.

134. Nehemiah Hunt, of Massachusetts, United States of America. Improvements in machinery for sewing cloth or other material. A communication from Christopher Hodgkins, of the aforesaid State.

135. Charles William Rowley Rickard, of Great Charlotte-street, Blackfriars-road. Improvements in cocks and taps.

Dated January 20, 1854.

136. Henry Dircks, of Moorgate-street, London, engineer. Improvements in safety-apparatus, applicable to certain boilers and stills.

137. Henry Bollmann Condy, of Battersea, Surrey. Improvements in the manufacture of sulphate of soda, sulphate of potash, and other sulphates, and in the manufacture and employment of muriatic acid.

138. Edward Aitchison, lieutenant in the Royal Navy, of M nor-street, Cheyne-walk, Chelsea, Middlesex. Improvements in apparatus for fixing, removing, and plugging tubes of tubular steam boilers.

139. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in cutting out cloth and other fabrics and materials suitable for garments and furniture. A communication.

140. Oliver Rice Chase, of Boston, State of Massachusetts, United States of America. Pulverizing-machinery.

141. James John Field, of Charles-terrace, Middlesex, gentleman. Improvements applicable to guns, cannon, or ordnance, rifles, and other similar implements of war or the chase, for more accurately aiming at the object to be struck by projectiles.

142. Robert Angus Smith, of Manchester, Lancaster, doctor of philosophy, and Alexander Mac Dougall, of same place, manufacturing chemist. Improvements in treating, deodorizing, and disinfecting sewage and other offensive matter, which said improvements are also applicable to deodorizing and disinfecting in general.

143. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the manufacture of stays or corsets. A communication from Adolphe Georges Geresme, of Paris, France, manufacturer.

Dated January 21, 1854.

144. Richard Roberts, of Manchester, engineer. Certain improvements in machinery for cutting paper, pasteboard, leather, cloth, and other materials.

146. Marie Louise Lise Beaudeloux, spinster, of Paris, France. A candlestick working by machinery, so as to keep the candle always at the same height in a tube, with a shade of a peculiar construction, so as to augment greatly the quantity of light.

148. George Grace and Thomas Francis Jones, both of Birmingham, Warwick. Improvements in boots and shoes, as also boot and shoe socks or inner soles, whereby the same are rendered waterproof.

149. John Westerton, of Earl's-court-road, Brompton, Middlesex. An improvement in the manufacture of night-light boxes or cases.

150. Cyprien Marie Tessié du Motay, chemist, of Rue Fontaine St. George, Paris. Improvements in the manufacture of oil from rosin.

151. Herman Eugene Falk, of Gateacre-house, Liverpool, merchant. Improvements in preparing or manufacturing salt.

152. Thomas Boulton Venables, of Burslem, Stafford. Certain improvements in the manufacture of earthenware.

153. Peter Spence, of Pendleton, near Manchester, Lancaster, manufacturing chemist. Improvements in manufacturing the prussiates of potash and soda.

154. Daniel Warren, of Exmouth, Devon, gentleman. Improvements in raising, pumping, or forcing water.

155. Charles John Edwards, of Great Sutton-street, Middlesex, leather, hose, and band manufacturer. Improvements in the manufacture of bands for driving machinery.

Dated January 23, 1854.

156. Andrew Shanks, engineer, of Robert-street, Adelphi, Westminster. Certain improvements in machinery for punching and shearing metals.

157. Charles Clarke Armstrong, of Birmingham, Warwick, manufacturer, and William Pursall, of Birmingham, aforesaid, manufacturer. A new or improved percussion-cap.

158. William Darling, of Edinburgh, Scotland, merchant. Improvements in sewing-machines. A communication.

160. Thomas Robinson, of Farringdon-street. Improvements in apparatus for filtering volatile liquids.

161. Matthew Andrew Muir, of Glasgow, Lanark, North Britain, machinist. Improvements in weaving.

162. John Lockhart, junior, of Paisley, Renfrew, North Britain, wood turner. Improvements in the manufacture of bobbins.

163. John George Taylor, of Glasgow, Lanark, North Britain, merchant. Improvements in treating the fleeces or natural coverings of sheep, and other animals, when on the animals.

164. John George Taylor, of Glasgow, Lanark,

North Britain, merchant. Improvements in lamps and in substances to be burned therein.

165. Henry Seebohm, of Eshol, near Leeds, York. Improvements in combing wool, goats'-hair, alpaca, cotton, and other fibrous material.

166. John Getty, of Liverpool, Lancaster, shipbuilder. Improvements in the manufacture of tubular bridges, part of which improvements is applicable also to the preparation of plates for covering iron ships, for constructing boilers, and for other analogous uses.

167. John Westlake, of Totnes, Devon, mine agent. Pulverizing, washing, separating, amalgamating, and otherwise treating ores, gossans, earths, and rocks, so as the better to obtain and extract therefrom the gold and other metals and minerals which may be contained therein.

168. Auguste Edouard Loradoux Bellford, of Castle-street, London. Improvements in machinery for bending metal and producing forms thereon by pressure. A communication.

169. Jean Marie Julien Louis Bouvet, of Boulevart St. Martin, Paris, France. Certain improvements in kneading-machines.

171. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in machinery for sawing stone and marble. A communication.

172. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in extracting copper from the ore. A communication.

173. Adolphus Theodore Wagner, of Berlin, Prussia, professor of music. A psychograph or apparatus for indicating persons' thoughts by the agency of nervous electricity.

Dated January 24, 1854.

175. George Williams, of Cannon-street, Saint George-in-the East, Middlesex, plumber. Improvements in the construction of water-closets.

177. Jean Louis Schlossmacher, lamp maker, of Paris, France. An improved support of lamps.

178. John Ridgway, of Cauldon-place, Stafford, china manufacturer. Certain improvements in the method of generating and applying heat to kilns, ovens, and furnaces, for manufacturing purposes.

179. William Irlam Ellis, of Salford, Lancaster, engineer. Certain improvements in turntables to be employed on or in connection with railways.

180. William Massey, of Hemer terrace, Bootle-cum-Linacre, near Liverpool, Lancaster, manufacturer of mineral teeth. Improvements in artificial teeth and gums.

181. John Bapty, of Leeds, York, yarn-spinner. Certain improvements in machinery for preparing to be spun, wool and other fibrous substances when mixed with wool.

182. Samuel Cunliffe Lister, of Manningham, Bradford, manufacturer. Improvements in combing wool, cotton, and other fibrous materials.

183. John Bird, manager of Chance's Fire-clay and Brick-works, Oak Farm, Kingswinford, near Dudley. Improvements in kilns for burning bricks and other articles.

Dated January 25, 1854.

184. Joseph Auguste Mingaud, manufacturer, of St. Pons (Hérault), France. Certain improvements in producing ornamental surfaces on velvet or other hairy cloths or fabrics.

186. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. An improvement in violins, and other similar stringed musical instruments. A communication.

188. William Henry Thornthwaite, of Newgate-street, London, operative chemist. An improvement in the manufacture of sulphuric acid.

190. Archibald Lockhart Reid, of Glasgow, Lanark, North Britain, print-cutter. Improvements in printing textile fabrics and other surfaces.

Dated January 26, 1854.

192. Thomas Wicksteed, of Leicester, civil engineer. Improvements in the manufacture of sewage-manure.

194. Thomas Wicksteed, of Leicester, civil engineer. Improvements in the manufacture of sewage-manure, and in apparatus for that purpose.

196. Charles Reeves, junior, of Birmingham, Warwick, manufacturer, and William Wells, of Sutton Coldfield, near Birmingham, aforesaid, carpenter. An improvement or improvements in casting metals.

198. Samuel Slack Stallard, of York-street, Welford, Leicester. Improvements in the manufacture of knit fabrics.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," February 7th,* 1854.)

2058. David Law. Improvements in moulding or shaping metals.

2118. Alexander Allan. Improvements in locomotive and other boilers for generating steam.

2141. Eliezer Edwards. A new or improved gas-stove.

2159. Alexander Thomson, and David Lockerbie. Improvements in kilns for baking and burning articles in earthenware.

2164. Jonathan Burton. Improvements in shuttles for weaving, the whole or part of which are applicable to skewers used in winding and reeling-machines.

2191. Frederick Crace Calvert. Certain improved processes for separating emery from other matters.

2200. Robert Varvill. An improved mortising-machine.

2210. Joseph Ellisdon. Improvements in chairs, whereby they are rendered more portable, and can be converted into other useful articles of household furniture.

2240. John Taylor. An improvement in the treatment or preparation of skins. A communication.

2277. Samuel Leake Worth, and Agmond Dishin Vesey Canavan. An improved polishing and brightening surface.

2304. Henry Kraut. Improvements in stands for casks and barrels.

2419. William Binns. An improvement in the treatment or finishing of woollen and worsted fabrics.

2492. Edward Loysel. An improved coffee-pot.

2564. William Edward Newton. Improved machinery for crushing ores, and separating therefrom gold, silver, or other metals contained therein. A communication.

2783. Peter Armand Lecomte de Fontainemoreau. Certain improvements in the construction of the Jacquard machine. A communication from M. Raymond Ronze, of Lyons, France.

2837. Julian Bernard. Improvements in machinery or apparatus for stitching or uniting and ornamenting various materials.

2913. Frederick William Branston. Improvements in certain tablets, labels, and signs, or their surfaces, exhibiting letters and designs.

2948. John Tribelhorn and Dr. Pompejus Bolley. Improvements in the process of bleaching vegetable fibrous substances. A communication from Charles Custer, of Altstaetten, near St. Gall, Switzerland.

2996. Edward Joseph Hughes. Improvements in sewing-machines. A communication.

3009. John Barnes. A certain improvement or

improvements in dyeing and cleansing cotton, silk, wool, and other fabrics.

3014. Henry Jackson. Improvements in machinery for moulding bricks and other articles of brick-earth.

3019. James William Crossley. Improvements in the production of surface finish to certain descriptions of fabrics composed of worsted, cotton, or silk, or combinations thereof.

3029. Isaac Holroyd. Improvements in apparatus employed in singeing textile fabrics.

3039. Julian Bernard. Improvements in stitching and ornamenting various materials, and in machinery and apparatus connected therewith.

27. John Mason, and Leonard Kaberry. Improvements in machinery or apparatus for preparing cotton, wool, and other fibrous materials for spinning.

58. Alexander Mitchell. Improvements in propelling vessels.

61. William Littell Tizard. Machinery for stamping, crushing, washing, and amalgamating gold and other ores.

71. Henry Beaumont Leeson. Improvements in gas-burners.

97. William Crosskill. Improvements in construction of portable railways.

107. William Crosskill. An improvement in the construction of carriage-wheels to run on railways and ordinary roads.

115. Edward Lord. Certain improvements in looms for weaving.

120. William Thomas. Improvements in stays.

134. Nehemiah Hunt. Improvements in machinery for sewing cloth or other materials. A communication from Christopher Hodgkins, of the State of Massachusetts.

138. Edward Aitchison. Improvements in apparatus for fixing, removing, and plugging tubes of tubular steam boilers.

150. Cyprien Marie Tessié du Motay. Improvements in the manufacture of oil from rosin.

160. Thomas Robinson. Improvements in apparatus for filtering volatile liquids.

162. John Lockhart, junior. Improvements in the manufacture of bobbins.

165. Henry Seebohm. Improvements in combing wool, goat's hair, alpaca, cotton, and other fibrous material.

168. Auguste Edouard Loradoux Bellford. Improvements in machinery for bending metal and producing forms thereon by pressure. A communication.

181. John Bapty. Certain improvements in machinery for preparing to be spun, wool and other fibrous substances when mixed with wool.

182. Samuel Cunliffe Lister. Improvements in combing wool, cotton, and other fibrous materials.

186. William Edward Newton. An improvement in violins, and other similar stringed musical instruments. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed February 3, 1854.

1811. Joseph Clisild Daniell.
1821. Charles Hill Snell.
1828. Joseph Lallemand.
1831. William Smith and Thomas Phillips.
1946. Jean Baptiste Polaillon and Francis Maillard.
2567. William Foster.
2649. Peter Alexander Halkett.

Sealed February 6, 1854.

1841. Richard Martin.
2257. James Leadbetter and William Wight.
2302. Alexander Edward Dudley Knox Archer.
2317. George Fergusson Wilson.
2483. Thomas Seal Blackwell.
2826. James Robertson.
2860. Arthur James.
2863. Charles Mackenzie and Alexander Turnbull.
2868. John Chisholm.
2896. Frederick Albert Gatty and Emile Kopp.
2916. Alexander Cochran.

Sealed February 8, 1854.

1865. David Mushet and Edwin Whele.
1883. Read Holliday.
1951. Samuel Lomas.
2513. John Gray.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

S. Tebay, Cambridge.—Your paper came too late for insertion in this Number. It will be published in our next.

R. H. S., Camden Town.—A voltaic battery, capable of fulfilling the conditions you mention, is very much needed by electricians. The *second* feature of your battery seems to resemble a modification of Daniell's now used as a constant battery by the Telegraph Company.

J. P., Pembroke.—The invention you communicate will be examined.

J. Selby, Bristol.—The law by which bodies cool in a vessel of which the temperature is constant is, that when the excesses of temperature are in arithmetical progression, the rate of cooling increases as the terms of a geometrical progression, diminished by a constant number. If v is the velocity of cooling, t the temperature of the thermometer in degrees, and a the number 10077, then the formula which expresses the relation between these quantities is

$$v = 2037\,(a^t - 1).$$

This equation was deduced from certain experiments made by M. M. Dulong and Petit, in which a heated thermometer was placed in a vessel, the temperature of the interior of which was 0 degrees,

and the rates of cooling for several temperatures were noted down. They found that

For the temperature 220 the rate of cooling was 8·81
„ „ 200 „ „ 7·40
„ „ 180 „ „ 6·10
„ „ 160 „ „ 4·89
„ „ 140 „ „ 3·88
„ „ 120 „ „ 3·02

and so on for other temperatures. That the formula very nearly expresses the physical law, may be seen from the following:

Values of t.	Observed values of v.	Calculated values of
220	8·81	8·89
200	7·40	7·34
180	6·10	6·03
160	4·89	4·87
140	3·88	3·80
120	3·02	3·05
100	2·30	2.33

It certainly requires some mathematical expertness to discover a formula which so nearly expresses the observed relations; but when the formula is found, the verification of it requires but a simple logarithmic computation.

T. R. R.—Perkins's "Hot-water Apparatus" was patented in 1831, and the patent was extended by the Privy Council in 1845. It is employed for a variety of purposes, such as the warming of buildings, heating liquids, evaporating syrup, melting soap, &c., &c., and is a very useful arrangement when the heat requires to be precisely regulated. In this apparatus the water is hermetically closed in a length of pipe forming a circuit, and is caused to circulate by the inequality of pressure occasioned by the inequality of the specific gravity of the differently-heated portions of the water. The jointing of the pipes employed in the apparatus is effected by means of intermediate screw-collars.

Errata.—Preceding Number, page 110, column 1, line 14 from top, for *form*, read *sum*; same column, line 24 from bottom, for *which occasions*, read *which is occasioned by*.

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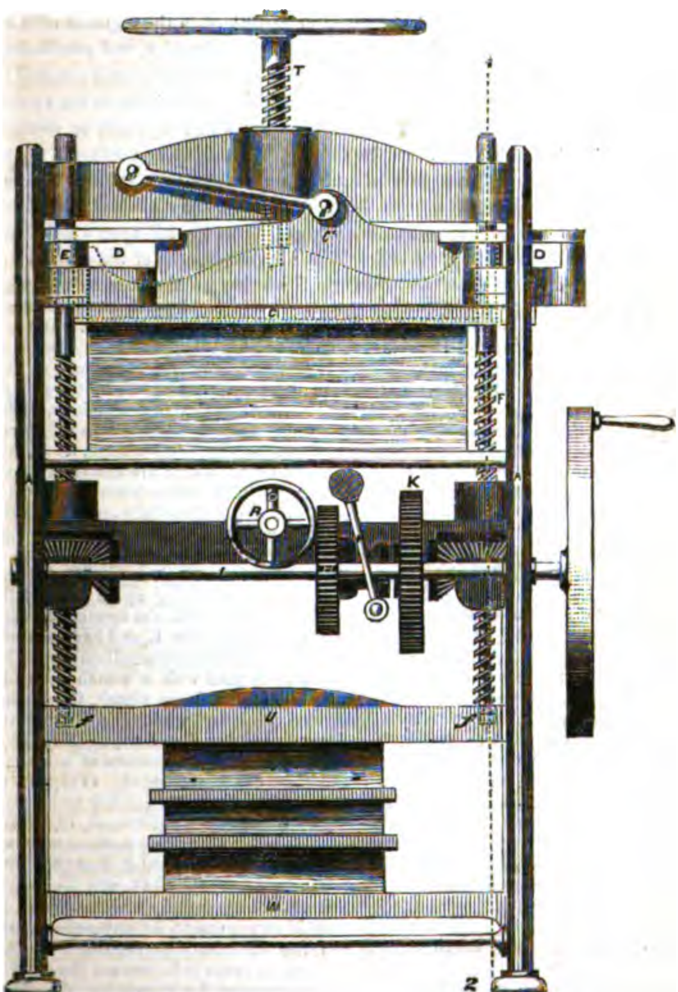
Mechanics' Magazine.

No. 1593.] SATURDAY, FEBRUARY 18, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

MORGAN'S PATENT PAPER AND CARDBOARD CUTTING MACHINES.

Fig. 1.



MORGAN'S PATENT PAPER AND CARDBOARD CUTTING MACHINES.

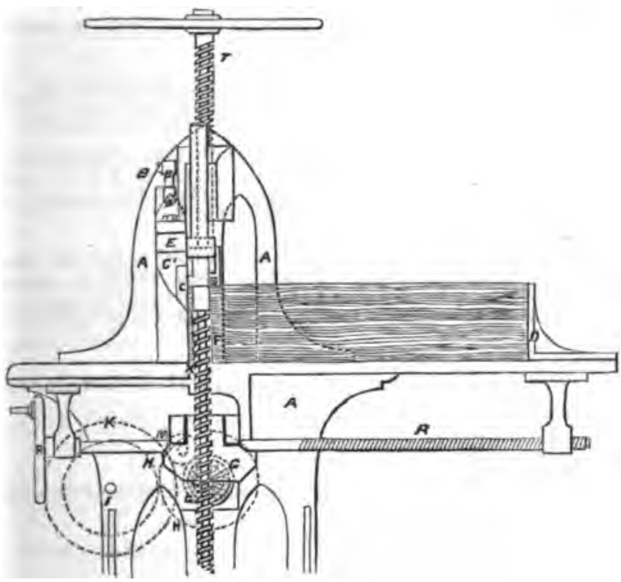
(Patent dated April 7, 1853.)

Mr. Morgan's invention has for its object the arranging the working parts of paper and cardboard-cutting machines in such a manner as to secure a clean smooth cut with comparatively but little exertion of power. With this view, he constructs such machines according to the following arrangements:—*First*, he makes the cutting knife or knives to rotate on its or their axis or axes, while the table on which the paper or cardboard is secured is made to traverse horizontally, and thus bring the paper or cardboard forcibly in contact with the rotating knife or knives; or he adopts the converse arrangement, and causes the rotating knife or knives to be traversed horizontally, and brought in contact with the paper or cardboard, which is then secured on a stationary table. *Second*, he employs a straight knife or cutter, and forces it through the paper or cardboard in the segment of a circle, or other suitable curve, guiding it in this course by a guide or guides, and combining with it the use of means for returning the knife to its original position after each cut, and applying an adjustable steel edge to the fixed part of the machine for the knife to cut against, as in a pair of scissors or shears, the knife being made to cut either upwards or downwards, as may be required. And *third*, he effects the cutting of the paper or cardboard by means of a weighted knife carried between parallel guides, and raised to a sufficient height, from which it is allowed to fall, so as to force the knife through the material by its descent; or he employs a weight, raised in a similar manner, and allowed to fall upon a knife in contact with the paper or cardboard, so as to effect the cut by the descent of the weight.

Fig. 1 is a front elevation, and fig. 2 a vertical section on the line 1, 2, of fig. 1, of a paper and cardboard-cutting machine, constructed according to the second of these arrangements. A A is the general framework of the machine. C is the knife or cutter, which is mounted in the carrier, C¹, and receives a radial motion, at the same time that it is forced downwards to make the cut, by means of the radius-rod, B, which is centred at B¹, in the cross framing, and attached at its other end to the knife-carrier, C¹, by the pin-joint, B². D D are slots at each end of the knife-carrier, in which slide the projections, E E, forged on the screws, F F, which are caused to travel downwards and upwards, and consequently to impart the like motions to the cutter by means of the bevel-wheels, G G, which are tapped as nuts, and are driven by the bevel-wheels, G¹ G¹, which are mounted on the spindle, L, which receives motion from the main shaft, I. These arrangements, it will be seen, have the effect of giving the knife the combined pressing and radially-cutting action which constitutes the main feature of this part of the invention. X is a regulating steel edge, fixed at one side of the table of the machine, for the knife to cut against, so as to secure a shearing cut at the last sheet. The manner in which motion is given to the screws, F F, so as to make the cut, and return the knife to a position for coming again into action, is as follows:—On the spindle, I, are fixed two cog-wheels, H and K, the former of which works into another cog-wheel, H¹, which is fitted loosely on the spindle, L, and has a clutch formed on one side of it; the latter of these wheels, K, works into the intermediate wheel, M, which again works into the cog-wheel, N, which is also formed with a clutch attached to it. Between the wheels, H¹ and N, on the spindle, L, slides a loose clutch, O, which is prevented from turning on the spindle by a feather on the latter, working into a groove in the clutch, in the usual way. The clutch, O, is moved in either direction, so as to be in gear with that formed on the wheel, H¹, or that on the wheel, N, by means of a lever, P, connected by rods with the knife-carrier, C¹, and thus the bevel-wheels, G G, are made to rotate alternately in opposite directions, so as to return the knife quickly to its place to be ready for another cut. The lever, P, is weighted, so as to keep the clutch, O, constantly in gear with the wheel, H¹, except when that lever is acted on by the knife-carrier, as before mentioned, and the clutch thrown in gear with the wheel, N (which had been previously running loose), when the motion of the cog-wheels, G¹ G¹ and G G, will be reversed, and the knife rapidly raised, owing to the proportionate sizes of the wheels, K and N. The inventor does not, however, confine himself to this arrangement, as any ordinary reversing motion may be used. The length of stroke of the knife may be regulated by tappets or similar means, which will act on the lever, P, so as to cause it to reverse the clutch at any required point of descent of the carrier. Q is the gauge for regulating the width of the paper to be cut. R is the screw by which the gauge is worked. S is the follower of the paper-holder, by which the paper or cardboard is held firm during the time the cut is being

made; and T the hand-wheel and screw for giving motion to the follower, these parts being similar to those of the ordinary machines. U is an iron plate, extending from one side to the other of the machine, and worked up and down in guides in the framing by means of the screws, F F, to which it is connected by pins working into the grooves, *f f*, formed at and around the lower extremities of the screws. When the cutting part of the machine is not required to be in use, this plate can be used for pressing books or paper, which are to be placed between it and the lower plate, W, of the frame, as in an ordinary standing press.

Fig. 2.



Instead of the screws and wheel-gearing employed for giving the cutting motion to the knife, and pressure to the standing press beneath, Mr. Morgan also adopts the use of a hydrostatic press, having two pumps of different sizes, the larger one to return the knife after the cut, and the smaller one to force the knife through the paper or cardboard; and he arranges the several parts so as to cut upwards or downwards, as may be most convenient; and in some cases he dispenses with the use of the radius-rod to the knife-carrier, and employs a knife with a slanting edge cutting against a fixed guide.

SOLUTION OF HYDROSTATICAL PROBLEM.

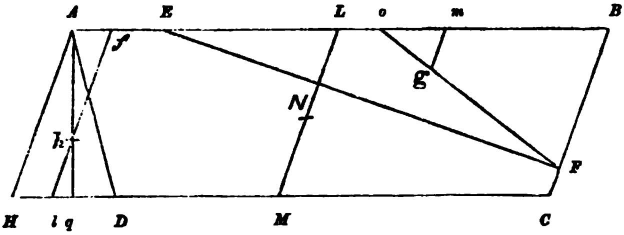
(ANTE PAGE 85.)

To the Editor of the Mechanics' Magazine.

SIR,—Your correspondent, "G. N.," who in your Number for January 28, asks for the solution of a certain hydrostatical problem which he there enunciates, is not likely, I fear, to obtain so much satisfaction as he desires. The strict analytical solution of almost all such problems as he proposes, leads to equations of an order which cannot very readily be solved. In the present instance a biquadratic results, which will be more readily solved when particular values are given to the constants involved, than when they remain general in form.

The problem is to find the line of flotation of a prism whose section is a trapezium, having the two longer sides parallel, floating in a fluid whose specific gravity is twice that of the prism.

Let A B C D be the prism. We will suppose (as will generally be the case) that E F, the line of flotation, cuts the two adjacent sides B A, B C in E and F.



Let B A $=a$, C D $=b$, B C $=c$, D A $=d$ be the four sides in order of magnitude; l the perpendicular distance between A B and D C: then evidently each of the angles A B C D, can be readily determined.

We have then to determine E F on the conditions—first, that it bisects A B C D; and, secondly, that the straight line joining the centres of gravity of A B C D, and the part immersed, A E F C; or, what is the same thing, the straight line joining the centre of gravity of the trapezium, and B E F is at right angles to E F.

Let B E $=h$ and B F $=k$.

Bisect B E in o and B A in L. Draw L M and A H parallel to B C, the latter meeting C D produced in H. Bisect D H in q, and L M in N. Join Fo and Aq, and take $og=\frac{1}{3}$ of Fo, and $gh=\frac{1}{3}$ of Ag and through h draw fhl parallel to B C, and through g, gm parallel to B C. Then g and h are the centres of gravity of E B F and A D H, and N of the parallelogram A B C H.

Take B A and B C for axes of x and y.

Then the condition that E F bisects the trapezium gives $hk.\sin B=\frac{1}{2}(a+b)l$,

$$\text{or, since } \sin B=\frac{l}{c},$$

$$hk=\tfrac{1}{2}(a+b)c=m^2 \text{ suppose} \quad . \; . \; . \quad \text{(I.)}$$

Let $\bar{x}$ and $\bar{y}$ be the co-ordinates Bm, mg of g, and $\overline{X}$, $\overline{Y}$ those of the centre of gravity of A B C D.

$$\left.\begin{aligned}\bar{x}&=Bm=\tfrac{2}{3}\,Bo=\tfrac{1}{3}h\\ \text{and } \bar{y}&=mg=\tfrac{1}{3}\,BF=\tfrac{1}{3}k\end{aligned}\right\} \quad . \; . \; . \; . \quad \text{(A.)}$$

Also, for $\overline{X}$ and $\overline{Y}$ we have the conditions

$$ABCH\times BL=ABCD\times\overline{X}+\Delta AHD\times Bf,$$

$$\text{and } ABCH\times LN=ABCD\times\overline{Y}+\Delta AHD\times fh,$$

$$\text{or, } al\times\frac{a}{2}=\tfrac{1}{2}(a+b)l\,\overline{X}+\tfrac{1}{2}(a-b)l\left\{a-\tfrac{1}{3}(a-b)\right\}$$

$$\text{or, } (a+b)\,\overline{X}=a^2-\frac{2a^2-ab-b^2}{3}=\frac{a^2+ab+b^2}{3}$$

$$\text{or, } \overline{X}=\frac{a^2+ab+b^2}{3(a+b)}$$

$$\text{and, } al\times\frac{c}{2}=\tfrac{1}{2}(a+b)l.\overline{Y}+\tfrac{1}{2}(a-b)\,l\times\frac{2c}{3}$$

$$\text{or, } (a+b)\,\overline{Y}=ac-(a-b)\,\frac{2c}{3}=\frac{(a+2b)c}{3}$$

$$\text{or, } \overline{Y}=\frac{(a+2b)c}{3(a+b)}.$$

Also, if θ be the angle which the line joining the centre of gravity of the trapezium with g makes with B A

$$\frac{\sin\theta}{\sin(B-\theta)}=\frac{\tan\theta}{\sin B-\cos B\tan\theta}=\frac{\overline{Y}-\bar{y}}{\overline{X}-\bar{x}}$$

$$=\frac{(a+2b)c-(a+b)k}{a^2+ab+b^2-(a+b)h}$$

$$\text{or, } \tan\theta = \frac{(\overline{a+2b}\,c - \overline{a+b}\,k)\sin B}{a^2+ab+b^2-(a+b)h + (\overline{a+2bc}-\overline{a+b}\,k)\cos B}$$

and if ϕ be the angle which E F makes with B A

$$\frac{\sin\phi}{\sin\overline{B-\phi}} = \frac{\tan\phi}{\sin B - \cos B\tan\phi} = -\frac{k}{h}$$

$$\text{or, } \tan\phi = -\frac{k\sin B}{h-k\cos B}\,.$$

The condition that these two straight lines be perpendicular, or $1+\tan\phi\tan\theta=0$ gives

$$1-\frac{k\sin^2 B\,(\overline{a+2b}\,c-\overline{a+b}\,k)}{(h-k\cos B)\left\{a^2+ab+b^2-\overline{a+b}\,h+(\overline{a+2b}\,c-\overline{a+b}\,k)\cos B\right\}}=0$$

$$\text{or, } (a^2+ab+b^2)h-\overline{a+b}\,h^2+\overline{a+2b}\,c\,h\cos B-\overline{a+b}\,hk\cos B$$

$$-(a^2+ab+b^2)k\cos B+\overline{a+b}\,hk\cos B-(a+2b)c\,k+\overline{a+b}\,k^2=0$$

$$\text{or, } (a+b)(k^2-h^2)-(a^{1^2}\cos B+b^{1^2})k+(a^{1^2}+b^{1^2}\cos B)h=0 \quad \text{(II.)}$$

$$\text{but } hk=c^{1^2} \text{ by } \quad \text{(I.)}$$

Whence, substituting for h in terms of k, we get,

$$(a+b)k^4-(a^{1^2}\cos B+b^{1^2})k^3+(a^{1^2}+b^{1^2}\cos B)c^{1^2}k-(a+b)c^{1^4}=0 \quad \text{(III.)}$$

A biquadratic equation which evidently gives two real roots of k; and similarly for h.

In order that the equilibrium be permanent, we must have

$$\frac{1}{24}\cdot\frac{EF^3}{c^{1^2}} > H^1G^1, \text{ where } H^1 \text{ is the centre of gravity of EFCD and } G^1 \text{ of ABCD,}$$

$$\frac{1}{24}\cdot\frac{(h^2+k^2-2hk.\cos B)^{\frac{3}{2}}}{c^{1^2}} > \sqrt{(x-\overline{X})^2+(y-\overline{Y})^2+2(x-\overline{X})(y-\overline{Y})\cos B}$$

where x and y are the co-ordinates of centre of gravity of E F C D,

$$\text{and } x=2\,\overline{X}-\frac{1}{3}h \text{ and } y=2\,\overline{Y}-\frac{1}{3}k$$

$$\text{whence } x-\overline{X}=\overline{X}-\frac{h}{3} \text{ and } y-\overline{Y}=\overline{Y}-\frac{k}{3}$$

$$\text{or, } \frac{1}{24}\,\frac{(h^2+k^2-c^{1^2}\cos B)^{\frac{3}{2}}}{c^{1^2}} >$$

$$\frac{1}{3(a+b)}\sqrt{(a^{1^2}-\overline{a+b}\,k)^2+(b^{1^2}-\overline{a+b}\,k)^2+2(a^{1^2}-\overline{a+b}\,h)\times(b^{1^2}-\overline{a+b}\,k)\cos B}$$

$$\text{or, } \frac{(h^2+k^2-c^{1^2}\cos B)^{\frac{3}{2}}}{4c\sqrt{(a^{1^2}-\overline{a+b}\,h)^2+(b^{1^2}-\overline{a+b}\,k)^2+2(a^{1^2}-\overline{a+b}.h)(b^{1^2}-\overline{a+b}.k)\cos B}} >$$

This last condition will enable us to determine whether any particular pair of values of h and k determined by means of equation (III) be that which determines the line of flotation.

A. B.

London, Feb. 9, 1854.

LONDON FIRES IN 1853.*

Twenty-third Annual Report. By Mr. William Baddeley, C.E., Inventor of the Portable Canvas Cisterns, Improved Jet-spreaders, Farmers' Fire-engine, Every Man his own Fireman, &c.

"The Statistics of London Fires are by no means devoid of interest, and the time may come when they will form an index to the social advancement of the people; for, in proportion as houses are built more and more fireproof, and habits of carefulness become more and more diffused, the number of destructive fires will assuredly lessen."—*Knight's London.*

ALTHOUGH we can hardly, as yet, boast of much improvement in the construction of our houses, nor congratulate ourselves upon any very extensive increase in "habits of carefulness," still the number of "destructive fires" has assuredly decreased during the year which has just closed upon us. The greatly increased number of population, and of buildings, would warrant the expectation of a corresponding increase in the number of fires; such, however, is not the result. The number of fires in 1853 was exactly 900, being 23 less than in the previous year, and 28 less than in 1851. Of last year's fires, 298 were extinguished by the unaided exertions of the inmates; 328 were extinguished by the inmates with casual assistance; while the extinguishing of 274 devolved upon the firemen.

Parish engineers rendered useful and efficient aid at 33 fires.

The total number of calls given at the fire-engine stations was 1062, being 43 less than in 1852, and 102 less than in 1851.

The following TABLE shows the Monthly Distribution of last Year's Fires:

Months.	Number of Fires.	Fatal Fires.	Number of Lives lost.	Chimneys on Fire.	False Alarms.
January	77	0	0	5	2
February	77	1	1	8	3
March	75	2	2	9	10
April	75	2	3	8	5
May	73	1	1	7	6
June	77	2	4	5	6
July	60	0	0	5	4
August	77	0	0	5	9
September	76	4	5	7	12
October	65	1	1	6	6
November	73	0	0	7	6
December	95	1	2	15	6
	900	14	19	87	75

Instances in which Insurances were known to have been effected

Upon the building and contents	418
Upon the building only	113
Upon the contents only	66
No insurance	303
	900
Chimneys on Fire	87
False alarms	75
Making the Total number of calls	1062

* We have to request that those of our contemporaries who avail themselves of the information contained in this Report will be pleased to acknowledge the source from which it is derived. We regret that experience has shown that, in justice to Mr. Baddeley, it is necessary for us to make this request.—ED. M. M.

The number of *fatal fires* exhibits a very satisfactory decrease, as does also the number of lives lost. These fires may be classed as follows:

		Fires.	Lives Lost.
Personal accidents from the ignition of wearing apparel	..	5	5
„ „ „ intoxication	..	2	3
Inability to escape from burning buildings, or killed in attempting to do so	..	7	11
		14	19

Some of the personal accidents were of an unusually painful character. The first of these took place on Wednesday, March 9th, at 3¾ A.M., when a fire broke out in the laboratory of Mr. Button, manufacturing chemist, Holborn-bars. The firemen were promptly in attendance, and in their anxiety to clear the place of the most inflammable substances, carried out a small vessel of phosphorus, which they rolled in the gutter. The fire in the warehouse was soon extinguished; but Mr. Andrew Paterson, a serjeant in the City Police, was so imprudent as to pick up and pocket a piece of the solid phosphorus. No sooner was it deposited in his pocket, than the warmth of his body caused the phosphorus to ignite and burn with great violence, and his clothing was soon in flames. An attempt was made to smother the fire by wrapping the tails of his great coat closely round him; but this only aggravated the mischief. James Haviland, a soldier of the Royal Artillery, rushed forward, and as rapidly as possible divested the serjeant of his burning apparel; in doing which he was himself so dreadfully burned that he had to be conveyed to the hospital. The police serjeant lingered some time in great agony; but death at last put an end to his sufferings. The heroic conduct of the artilleryman was the theme of universal admiration, and obtained a suitable acknowledgment. The constables of the second division, to which the deceased had belonged, and by whom he was greatly esteemed, presented the soldier with a silver watch and guard, bearing a suitable inscription. Public subscriptions were sent, unsolicited, to the amount of £200, which was presented to James Haviland, by Sir R. W. Carden, with a suitable eulogy. At a Special General Meeting of the Royal Society for the Protection of Life from Fire, held on the 4th of July following, James Haviland was presented with a testimonial in vellum, in approbation of his intrepid conduct.

June 25th, 8¾ P.M., a fatal fire took place in Montague-court, Bishopsgate-street, from a spark flying out of the fire and igniting a quantity of wearing apparel; in her endeavours to extinguish the fire, Mrs. Sheety's clothes ignited, and she was so severely burned that she expired two days afterwards.

September 3rd, ¾ A.M., a fire broke out in White Lion-place, Edgeware-road, in an apartment occupied by Mr. and Mrs. Daniels. The husband was an old soldier, and an out-pensioner of Chelsea Hospital; he had the previous day received some money, and indulged in drinking; a drunken quarrel ensued, in which it would seem he had attempted to carry out a threat which he had previously been heard to utter, that "he would burn the house down." The fire was soon got under, but the inmates of the room both perished.

The deaths from inability to escape from burning buildings present many painfully distressing features, and also convey impressive lessons.

The first of these occurred on Monday, March 21st, at 3 A.M., in the premises of Mr. Window, licensed victualler, 119, Long Acre, which was attended with a great destruction of property, and the loss of one life. It appears that in the course of the previous evening the inmates perceived smoke issuing from the interstices of the tap-room flooring, evidently the result of some unextinguished tobacco which had fallen into the opening; having poured some water into the aperture, they supposed it was all right, and retired to rest. This proved to be a fatal error. The fire mouldered on, silently but surely spreading, until the time stated, when the flames broke forth with irresistible fury. Some of the inmates, who were first roused, were able to rush through the fire and smoke, and gain the street. Mr. Window and his wife, being unable to pass down the stairs, went to the second-floor window, and, tying the blankets together, formed a rope, and were ultimately rescued by the police with Merryweather's portable fire-escape ladders. The servant-maid escaped by the trap-door, and made for the adjoining workshop; but, losing her balance, fell heavily to the ground. The potman, who was the worse for liquor when he retired to rest, and who was sleeping on the third floor, is supposed, on opening his door, to have been met by the flames, which caused his death. Some time elapsed before the alarm was given to the fire-escape conductor, at St. Martin's church; consequently, on his arrival, the fire had got such firm hold of the building that he could not possibly enter it. Had the inmates obtained the attendance of a fireman from the Chandos-

street Station (and they are always to be had *by asking for*—their services being also, *in all cases, gratuitous*) when the smoke was first perceived issuing from the tap-room floor, this calamity would assuredly have been prevented.

The next fatal fire was also at a licensed victualler's, breaking out at 2 A.M., Friday, April 22nd, in the premises of Mr. Tritner, the "Black Horse and Windmill," Field-gate-street, Whitechapel. The fire began in the spirit-cellar, and burnt with great rapidity. On its discovery by the policeman, he gave an alarm, and set about arousing the inmates; but before this could be effected, the flame and smoke ascending the staircase, rendered it impassable. Very few minutes elapsed before Conductor Wood, with the Whitechapel fire-escape, was on the spot. Ascending to the second-floor window, he found a man almost stifled with the smoke, and at once brought him down the escape. On searching for the other inmates, he found they had got out of a back window on to the roof of an adjoining house, and having fallen partially through a skylight, were bleeding profusely from cuts in their legs and thighs. The conductor, rolling himself down a gable roof, was soon by their side; and assisted by a police constable, and his short ladder, he safely carried down another man and three females, who were at once conveyed to the London Hospital. The conductor's search for Mr. Tritner, the landlord, proved fruitless; and it was not until some hours afterward that he was found, suffocated, on the parlour floor. It is supposed that he went down to the bar to save some property, and was overpowered by the smoke; a wire blind having fallen upon him, prevented an earlier discovery of the body.

Wednesday, April 27th, 2½ A.M., a fire broke out in Phœnix-place, Lower Calthorpe-street, Gray's-inn-road, attended with disastrous results. It appeared that for more than an hour the police constables on the adjacent beats had smelt fire, without being able to discover its locality; the smoke was at last discovered issuing from No. 1, in the above place. Some time elapsed before the three families who occupied the premises could be roused to a sense of their danger, by which time the staircase was enveloped in flames. Mr. Mills, his wife, and three children jumped from a lower window, and escaped unhurt. Mr. and Mrs. Rainey, with their daughter, jumped from the window above, and were all, more or less, hurt. Mr. Brown, his wife, and infant (after an ineffectual attempt to rouse his two sons, who were sleeping in an adjoining room) jumped from the window, without injury. At this moment, Hudson, the conductor of the fire-escape, arrived from the Foundling, and hearing that two persons were still in the building, ascended his machine, and dashed into the front window; but was met by a body of flame, which compelled him to retreat, being so dreadfully burned about the hands and face that it was necessary to convey him to the Free Hospital, where he lay for some time in a very precarious state. After the fire, the charred remains of the two lads, Charles and William Brown, were found in the lower part of the premises. The fire was supposed to have occurred from a horse of clothes being left before a fire in the ground-floor back room.

Monday, May 30th, 2 A.M., a calamitous fire broke out in the house of Mr. Pike, Denmark-terrace, White Conduit-street, Islington. A lamplighter in passing discovered the fire and raised an alarm, which brought up serjeant Cotter and two other constables, who at once set to work to rescue the inmates. A female lodger and her servant, Mr. and Mrs. Pike, and four children, were safely brought out, and were supposed to be all the inmates. A messenger was *then* despatched—*twenty minutes having elapsed*—to the police station and fire-escape, only three minutes distant! The fire-escape was quickly brought, but on its arrival the flames were issuing from all the windows, in consequence of a neighbour having most imprudently broken open the lower part of the premises with a large weight. Mr. Pike also desired the escape conductor not to attempt to enter the premises, as the inmates were all safe. Mr. Brown promptly arrived with the Islington engine, and finding it impossible to save any portion of Mr. Pike's premises, he exerted himself to preserve the adjoining building, the "King of Denmark," to which the fire was rapidly extending. His efforts proved eminently successful, and the arrival of the Clerkenwell, Brigade, and West of England engines, soon completed the extinction of the fire. Scarcely had this been accomplished, when Mr. Pike discovered that his son Frederick, seven years of age, was missing. The fire-escape conductor, assisted by his inspector, ascended to the second-floor back-room, where they found the body of the unfortunate youth, lying on a portion of the bed from which he had not risen, and which rested upon the nearly destroyed joists. With great difficulty the body was extricated, and at an inquest on the following day a verdict of accidental death was returned, Mr. Brent, the coroner, observing that "*there could be little doubt, if timely application had been made to the fire-escape conductor this loss of life would have been prevented.*"

Saturday, June 25th, 7 P.M., a fire, attended with a most lamentable loss of life, took place. A City police constable on Holborn-hill observed a great body of smoke issuing from a chimney of the house No. 107, Hatton-garden; after watching for some time, he saw sparks fly out, and immediately sent for the Farringdon-street Brigade to attend a *chimney on fire;* on their arrival, however, it was evident that the ground-floor front-room (occupied by Mr. Ross as an India-rubber shoe warehouse) was in flames. At this time several persons were in the house; a female named Ann Dare, who was cleaning the stairs, instead of descending, went up stairs to fetch some article of wearing apparel. Mr. Andrew Stephens, a portrait painter, who had escaped, also returned, as is supposed, to save a dog. During the time these parties were up-stairs, a tradesman living opposite broke open the door of Mr. Ross's apartment, when the flames rushed up the staircase, and cut off the escape of those above. The female directly afterwards precipitated herself from a second-floor window, and falling upon the railing received such serious injuries, that after lingering for a week she expired. Mr. Stephens was seen at the window, but immediately disappeared, and after the fire was extinguished his body, as also that of a young girl, six years of age, were found in the ruins. The fire was said to have arisen from a spark having fallen into the chimney, which, being foul, ignited, and the burning soot falling into the room set fire to some packing-cases ranged round the fire-place; considerable doubts exist, however, as to the real origin of this fire, which unfortunately took place before the fire-escapes came on duty.

Sunday, September 11th, 10½ P.M., a fire broke out in an apartment occupied by Mr. Levine, No. 45, Castle-street, Whitechapel. The scene of this disaster was the first-floor front room, used for making waterproof garments, and in which three persons were at the time sleeping. It appeared that a large quantity of naphtha in the room suddenly took fire; two of the inmates managed to escape, but a young man, named Abrahams, fell overpowered on the floor. The fire-escapes from Aldgate and Whitechapel were soon in attendance, and their conductors, Wood and Newell, having thrown some water into the burning room, dashed in, and brought out the unfortunate sufferer alive, but he soon afterwards expired.

Saturday, December 10th, 7½ A.M., a fire broke out very suddenly in the premises of Mr. Mustard, baker, No. 24, Grafton-street, Fitzroy-square. Notwithstanding the advanced hour of the morning, great difficulty was experienced in rousing the inmates to a sense of their danger; with the exception of two male lodgers, however, all escaped. One of the lodgers, named Rogers, was burned to death; the other, J. Connor, was got out alive, but expired afterwards in the hospital.

During the year, the fire-escape conductors of the *Royal Society for the Protection of Life from Fire* have attended 322 fires, nearly all that have occurred in their districts during the hours of duty, and have happily saved the lives of nineteen persons, who, but for their assistance, must have perished, or sustained serious injuries, viz.:

January	2,	No. 12,	Manchester-street, Manchester-square	3	lives saved
„	25,	„ 38,	Sun-street, Finsbury	2	„
April	22,	„ 5,	Fieldgate-street, Whitechapel	5	„
June	28,	„ 21,	Little Alie-street, Goodman's-fields	2	„
Nov.	12,	„ 3,	Surrey-place, Newington Butts	5	„
Dec.	6,	„ 51,	Aldersgate-street	2	„
				19	

Two new stations have been provided with fire-escapes since the last report, viz., *Newington*, opposite the Elephant and Castle; and *Finsbury*, corner of West-street. The former escape came into useful operation on the 12th November, as above shown. The escape formerly stationed at the Obelisk in Blackfriars-road has been moved to the Surrey chapel, so as to equalise the distances between the Southwark stations. The total number of fire-escapes now nightly stationed in the metropolis is FORTY, each attended by a conductor, properly equipped and trained, whose duty it is to attend every fire between his and the next station upon the very first alarm being communicated to him. Every inducement is held out to the police and others to give early calls to the fire-escapes, as the utmost vigilance of the conductors, and the excellence of the machines, will not avail if the call is not forwarded the moment a fire is discovered. Happily it is now becoming pretty generally recognised, that the call for the fire-escape should *precede* even that for the fire-engines, although *no delay* should be permitted in calling the latter. Whatever may be the amount of *property* in jeopardy, *life* is much more precious.

The following is an analysis, in a tabular form, of the fires which occurred in London in 1853, exhibiting in each instance the occupancy of that part of the premises in which the fire originated, and the comparative liability to accident by fire of various trades, manufactories, and private dwellings:

Occupation.	Totally Destroyed.	Seriously Damaged.	Slightly Damaged.	Total.
Apothecaries and dealers in drugs, but unchemical works carried on	—	1	1	2
Bacon-dryers	—	—	1	1
Bakers	—	5	13	18
———, pie	—	1	—	1
Barge and boat-builders	—	—	1	1
Basket-makers	—	1	2	3
Beershops	—	2	7	9
Booksellers, binders, and stationers	—	5	9	14
Brewers	—	—	1	1
Brokers, and dealers in old clothes	1	3	5	9
Builders	—	2	6	8
Butchers	—	—	1	1
Cabinet-makers	1	9	9	19
Carpenters and workers in wood, not cabinet-makers	1	17	25	43
Coach makers	—	2	—	2
Cement and plaster of paris works	—	1	—	1
Chandlers	—	3	1	4
Charcoal and coke, dealers in	—	1	—	1
Cheesemongers	—	—	3	3
Churches	—	—	1	1
Coal-merchants	1	—	2	3
Cocoa-nut-fibre manufacturers	—	1	—	1
Coffee-roasters	—	1	1	2
Coffee-shops and chop-houses	—	2	5	7
Colour-makers	—	2	1	3
Confectioners and pastrycooks	—	3	2	5
Coopers	—	—	1	1
Cork-cutters	1	—	1	2
Corn-mills	—	—	1	1
Corn-chandlers	—	1	2	3
Curriers and leather-dressers	—	2	1	3
Distillers, illicit	—	—	2	2
————, turpentine	1	—	—	1
Drapers, woollen, linen, and mercers	—	9	14	23
Drysalters	—	1	—	1
Dyers	—	1	—	1
Dwellings, private	1	28	302	331
Eating-houses	—	2	3	5
Engineers, mechanical	1	1	5	7
Farming stock	—	16	2	18
Fellmongers	—	2	—	2
Felt-makers	—	1	—	1
Firework-makers	—	3	1	4
Fish-curers	—	—	2	2
Founders	—	—	2	2
French fancy warehouses	—	—	1	1
Furriers and skin-dyers	—	—	1	1
Gas-works	—	—	1	1
Glue-makers	—	—	1	1
Granary-keeper	—	1	—	1

Occupation.	Totally Destroyed.	Seriously Damaged.	Slightly Damaged.	Total.
Grocers	—	5	2	7
Gutta percha works	—	1	—	1
Hat-makers	1	5	1	7
Horsehair merchants	—	—	1	1
Hotels and club-houses	—	2	3	5
Ink-makers	—	—	1	1
Japanners	1	1	—	2
Lampblack-makers	—	—	3	3
Laundresses	—	2	4	6
Lucifer-match-makers	—	1	3	4
Manchester warehouses	—	4	3	7
Marine stores, dealers in	—	1	6	7
Mattress-makers	—	—	1	1
Markets	—	—	1	1
Mat-makers	—	1	—	1
Milliners and dress-makers	—	3	10	13
Musical-instrument-makers	—	2	—	2
Nuts, dealers in	—	—	2	2
Oil and colourmen, not colour-works	—	11	9	20
Oil-works	—	1	—	1
Palace	—	1	—	1
Painters, plumbers, and glaziers	—	—	3	3
Painted-baize makers	—	—	1	1
Paper-mills	—	1	—	1
—— stainers	—	2	—	2
Pasteboard-makers	—	1	—	1
Playing-card makers	—	—	1	1
Potteries	—	1	—	1
Printers	—	5	2	7
——, copper-plate	—	—	1	1
Public buildings	—	—	1	1
Rag-merchants	—	3	1	4
Ropemakers	—	2	—	2
Sailmakers	—	1	—	1
Sale-shops and offices	—	8	24	32
Saw-mills, steam	—	3	2	5
Schools	—	2	2	4
Scum-boiler	—	—	1	1
Ships	—	2	2	4
——, steam	—	1	—	1
Shipbuilders	—	2	1	3
Stables	—	8	14	22
Starch-makers	—	1	—	1
Straw-bonnet makers	—	2	3	5
Sugar-refiners	—	—	2	2
Tailors	—	4	4	8
Tarpaulin-makers	—	—	1	1
Theatres	1	—	1	2
Tinmen, braziers, and smiths	—	4	12	16
Tobacconists	—	—	7	7
Tobacco-manufacturer	—	—	1	1
Toy-warehouses	—	1	1	2
Under repair and building	6	2	7	15
Unoccupied	—	—	7	7
Upholsterers	1	1	2	4
Victuallers, licensed	1	8	32	41
Wadding-makers	—	—	2	2
Waterproof canvas-makers	—	3	4	7

Occupation.	Totally Destroyed.	Seriously Damaged.	Slightly Damaged.	Total.
Warehouses	1	1	1	3
Waxwork, exhibition of	—	1	—	1
Wharfingers	—	—	1	1
Wine and Spirit merchants	—	—	5	5
Total	20	241	639	900

(To be continued in our next.)

MACADAMIZED ROADS—WORKS ON THE RIVER LEE.

In the discussion at the Institution of Civil Engineers on February 7, upon Mr. Pigott Smith's paper "On the Use of the Macadamizing System for the Streets of Large Towns," numerous details were given of the comparative prices of the materials in the country and in the metropolis,—the method of laying them down,—the successive employment of set paving stones in large thoroughfares, then in less frequented streets, and ultimately breaking them up for macadamizing, thus giving the materials an almost unlimited duration. The use of the grit, as collected by the sweeping machines, was admitted to be advantageous for binding the metalling quickly, and preventing the abrasion of the angles of the stones. It was, however, shown that the traffic of country towns was so vastly inferior, in amount and weight, to that of the metropolis, especially since the introduction of the heavy railway, and other vans, travelling at considerable speed, upon comparatively narrow wheels, that a system of forming streets or roads which would endure well in one case, was not applicable for another; and hence the present bad condition of Parliament-street and other streets which had been macadamized, and which, it was contended, could only be maintained, even in their present state, at a cost greatly exceeding that of the paved streets of the City.

The Paper read was a "Description of the Navigation and Drainage Works recently executed on the Tidal portion of the River Lee," by Mr. N. Beardmore, M. Inst. C. E.

The first part contained a general description of the ancient navigation of the River Lee, and of the gradual improvements introduced into the class of barges frequenting it, and the burthens carried by them. Allusion was made to the difficulties and continual delays which had prevailed, up to a very recent period, in the tidal portion, forming the junction with Bow-creek and the Thames at Limehouse, difficulties which were aggravated by the navigation being the common supply for five tidal mills.

The new works consisted of stop-gates, across the main channel of the Lee, near Old Ford Lock, established for preventing the water from being drawn down by the tidal mills to the eastward; also a lock for a similar purpose, and to pass barges on St. Thomas's-creek, near Bow-bridge, and a new overfall, to pass surplus water to the Three Mills.

Three large new floodgates, each 18 feet in width, were constructed near Four Mills, with a new tidal lock, adjacent to the spot, in order to pass vessels into Bow-creek, the ancient system being to pass craft by a single pair of gates, only available by drawing down the head-water, and, frequently, during neap tides, the water did not rise high enough to enable the gates to be opened at all.

The remaining new works consisted of a lock at the east end of the Limehouse-cut, to retain the water, when, in consequence of floods, the Bromley flood-gates were required to be opened, the lock being of such a width as to allow vessels of 21 feet beam to enter the cut; the former lock being only capable of admitting barges of 13 feet 6 inches beam.

In consequence of the treacherous nature of the material at the Bromley end of the Limehouse-cut, it was necessary to re-excavate the cut,—to give flatter slopes, and also to build retaining walls of Kentish rag for the towing-path.

The paper concluded by alluding to other considerable works which had been recently executed at the lower end of the navigation, where it formed a junction with the Regent's-canal basin, thus giving access to Armstrong's hydraulic coal lifts and cranes, with the dock conveniences and the wider locks, recently executed by Mr. W. Radford for the Regent's-canal Company.

A SPIRITUAL MACHINE.

On the same day as our notice of M. Wagner's Thought Indicator was published, the *Scientific American* issued an article, headed as above, containing a description of a machine just invented by Mr. J. T. Pease, of Thompsonville, Connecticut, called a Spiritual Telegraph Dial. The apparatus is contrived with a dial-face, on which are marked the letters of the alphabet, the numerals, the words "yes" and "no," and other convenient signs. A moveable hand, or pointer, is fixed in the centre; "and when a ghost wants to communicate with its pupils and friends in the body, all that is requisite is, for it to give a gentle twitch to the pointer, and the revelation is accomplished." Mr. Pease states, "that with a good tipping medium to facilitate the movements of the pointer by agitating the table, letters will be indicated to the dial as fast as an amanuensis can write it down."

GRIBBON'S PATENT IMPROVEMENTS IN WINDOW-FRAMES AND SASHES.

Mr. E. P. Gribbon, architect, of Dublin, has lately patented an invention which is admirably calculated to remove the great objections to the window-frames and sashes now generally employed throughout the United Kingdoms,—viz., the inconvenience and danger arising from the necessity of cleaning and repairing windows from the outside,—the existence of draughts occasioned by loose beads,—and the expense of repairing the injuries done to the frames by the frequent removal of the beads. The number of accidents arising from the first of these is much greater than is generally believed, which is due probably to the fact that the sufferers are invariably persons of obscure positions; it will, however, be admitted, that the evil is one which cannot too soon be remedied.

Before describing the invention, we desire to call attention to one important characteristic which will be found to belong to it; it is, that Mr. Gribbon's improvements can be applied to existing windows as readily as to new ones. The advantage of this will be instantly seen when it is remembered that if the number of windows be assumed only equal to the number of the inhabitants, and the value of each be estimated at £3, the capital at present represented by the windows of the United Kingdom amounts to about eighty millions of pounds. Any invention, the general introduction of which would require the cancelling of property to such an extent as is thus indicated, would not be likely to meet with any considerable patronage; and it is fortunate for the present inventor that he has avoided this objection, and has so satisfactorily adapted his invention to existing property.

Models of Mr. Gribbon's improvements have been exhibited before the Institute of British Architects, and met with a favourable reception.

The invention consists in constructing and fitting window-frames and sashes in such manner that the sashes can be unfixed and refixed, unhung and rehung by hand, without the use of a hammer and chisel or other instrument, and without unfixing the sash-beads. In carrying it into effect, Mr. Gribbon makes one pulley-style wholly or partially moveable, so as to widen the space between the two pulley-styles to such an extent as to allow the sash to be pulled clear out of the bead of the opposite pulley-style; and when both the upper and lower sashes are required to be unhung, he then makes both pulley-styles wholly or partially moveable in a similar manner, one for the lower, and the other for the upper sash. He fastens the weight-lines to the sashes by means of metal plates, having a slot, with an enlarged orifice at the bottom for receiving the knot at the end of the line, which then passes up the slot in the plate, and is thus held secure. In order to free the sash, the line must be pulled down until the knot reaches the orifice at the bottom of the slot in the plate, through which it will readily pass, so as to become detached from the sash. The line is prevented from chafing while the sash is hung by lying in a groove cut along the edge of the sash for that purpose.

Fig. 1 of the accompanying engravings is a sectional elevation of a window-frame and sash having a portion of both pulley-styles moveable, showing the moveable por- of one pulley-style open or thrown back for the removal of the lower sash, the other pulley-style being omitted, as the section is taken through the front one only. A A is the window-frame, and B the lower sash. C is the moveable portion of the pulley-style which is connected to the fixed parts thereof by means of the hinges, D E. The peculiar construction of these hinges is more clearly shown in figs. 2, 3, and 4, of which fig. 2 is a vertical section, showing the moveable part of the pulley-style, C, thrown back, and forming a recess, into which one side of the lower sash passes, to enable the other side to move clear of the oppos ite bead; fig. 3 is a vertical section showing the moveable part of the pulley-

style, C, at rest, and fig. 4, a front elevation of the parts in the same position. The pulley, G, over which the weight-line runs, is fixed in the moveable part of the pulley-style, and the weight of the sash and sash-weights thrown thereon keeps it closed. A bolt or fastening-pin might be added, but is not considered necessary by the inventor.

Fig. 5 is an edge view, and fig. 6 a vertical section of part of a window-sash, showing the means adopted for attaching the sash-lines, so as to enable the sashes to

Fig. 5. Fig. 1. Fig. 3. Fig. 4. Fig. 2.

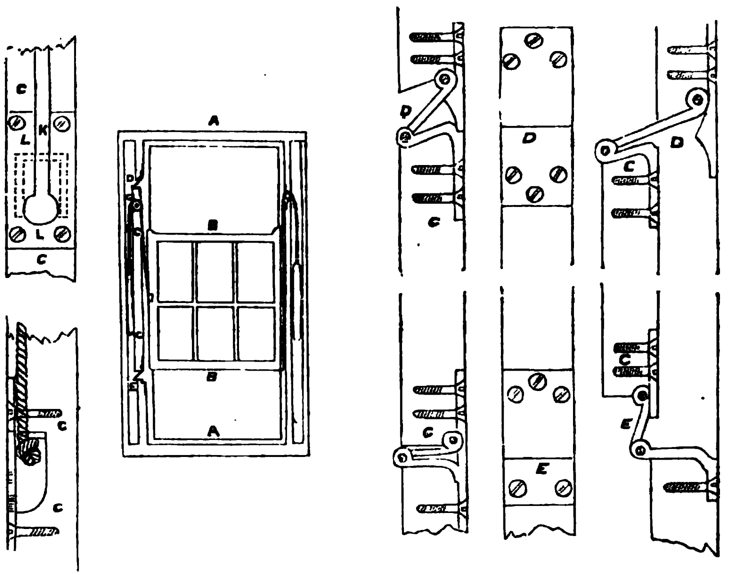


Fig. 6.

be readily unhung when removed from the window-frame, and rehung when required to be replaced. C is part of the sash-frame, I the sash-line knotted at its lower end, the other end passing over the sash-pulley, and being secured to the sash-weight in the ordinary manner; K is the groove in the edge of the sash-frame, in which the sash-line lies; L the slotted plate, with enlarged orifice for the entrance of the knot on the sash-line; and M a stop at the back of the plate, against which the knot of the sash-line is held. This method of securing the sash-lines may also be used independent of the former improvements.

MATHEMATICAL PERIODICALS.

(See vol. lix., page 528.)

To the Editor of the Mechanics' Magazine.

Sir,—My attention has been directed to an article in the "Mechanics' Magazine" on "Mathematical Periodicals," by your correspondent Wilkinson, of Burnley, in which he states that "The prize in one of our most valued annual publications has recently been awarded to a Lancashire gentleman, whose solutions are well known to be furnished to him by a friend at Cambridge." As this reflection has a direct bearing upon myself, I beg to trouble you with the following remarks.

In the first place, I wish to know who "furnished" this gentleman with his information? Because the individual alluded to is a particular friend of mine, he supposes that I "furnished" him with his solutions. I beg most emphatically to state that I did not. This gentleman wrote to ask me what I meant by the "just touching" of the balls in the prize question of last year. I could not hesitate to "furnish" him with an explanation, from which I suppose he moulded his solution.

Several other gentlemen wrote to me for similar information (Mr. Wilkinson for one), and I gave it. I have always been willing to lend my assistance in such cases, but not with an intention to damage the reputation of the "Diary." Mr. Wilkinson goes on to say, "Such practices deserve severe reprobation; for if persisted in for any length of time, they must inevitably damage the reputation of the periodical, and lead to a general distrust of those contributors whose solutions are their own genuine productions." Very true indeed! and Mr. Wilkinson would thus lead us to suppose that *he* is *one* of those "genuine" contributors. So be it. But how can such practices be altogether avoided in such a publication as the "Diary," where six months is given for the solution of questions, with the advantage of every possible reference? Where is there a schoolmaster who will not encourage and *assist* his pupils in answering these questions? And what injury is likely to fall upon the "Diary" from such a practice? Whether is it a greater fault, Sir, to answer questions under these circumstances, or to pilfer the solutions from books?

Again he says, "No blame whatever can attach to the Editors of such works, for they can only judge of the abilities of correspondents from the solutions sent." Here, again, he seems to make himself pretty safe with the Editor. If the Editor be *really* thus deceived, and solutions *do* find their way into print under false authors, this will sufficiently account for certain gentlemen appearing much more "accomplished" than they really are.

As to Mr. Wilkinson's sincerity for the welfare of the "Diary," I am persuaded he has none; at least he cannot be so violently sincere as he fain would have his readers to believe, otherwise he would not stoop, in any shape, to such practices himself. Perhaps I may be asked for an explanation of this. The following little anecdote connected with this gentleman will serve to illustrate what I mean. A mutual friend of mine and Mr. Wilkinson's told me that they had put their solutions together; that is, made mutual exchanges, in order that both might make a greater score than either could separately. Surely this may seem to be a very fair way of dealing, particularly by two friends, when no jealousy is likely to arise; but its general adoption, I fear, would lead to the same inevitable consequences as those alluded to by Mr. Wilkinson. Other instances could be adduced, but this will suffice to show how little we ought to trust in the apparent sincerity of an individual writing with an evident design; a design not only to crush the reputation and lower the esteem of others in the eyes of their dependents, but also to prepare for himself a clearer path to eminence. "If such practices be persisted in," they must damage the prosperity of the publication; for that can only depend on the number of contributors; and if these, through fear of slander, find it expedient to withdraw their correspondence, then what must be the result?

I remain, very truly yours,

S. Tebay.

Cambridge, Feb. 8, 1854.

P.S. The system of exchange alluded to above, I believe to have been practised to a considerable extent among the present degenerate race of "Lancashire mathematicians," of the glory of whose ancestors so much has been said. Such, however, is the general wreck, that, with one or two solitary exceptions, there does not remain a single spark of that sterling genius which characterises the labours of Butterworth, Smith, Swale, and Wolfenden. S. T.

BELL'S REAPING MACHINE.

We have received a letter from Mr. Crosskill, complaining of our strictures with reference to the Reaper exhibited at the Smithfield Show as "Bell's Original Reaping Machine." Mr. Crosskill states, that he made an agreement with the Rev. P. Bell's brother, understanding that the Rev. P. Bell had himself agreed to the arrangement, and expresses his surprise at the reverend gentleman's public disavowal of all knowledge of it.

Elementary Statics; being the first part of a Treatise on Mechanics for the Use of Schools. By the Rev. R. Fowler, B.A., Principal of the Diocesan Training College, Chester.

School Poetry.

The World; or, General Geography. Published by the National Society, London.

Of these three school-books, the first only requires more than a very few words from us. It will be sufficient commendation of the poetical compilation to say that it contains nothing frivolous, or injurious to the young, being composed of selections from the simpler narrative and lyric productions of Mrs. Hemans, Cowper, Wordsworth, Scott, Southey, Campbell, and a few others. The tendency of it must be to improve and purify youthful minds. The geographical tract is full of well-chosen facts, and is calculated to answer its design perfectly, we should think.

We must, however, pause a little over the Elementary Treatise on Mechanics, since it does not merit unqualified praise, and must not be dismissed with careless criticism merely because it is low-priced. It is published for the instruction of large numbers of our youth and others,—for those who are now, and who are hereafter to become the artisans and mechanics of our kingdom,—and on that account it should be cautiously examined and fairly estimated. The book, in fact, is intended by the author to fill up the "large and almost empty space" that exists between "sound and complete works on the theory of mechanics, on the one hand," and "full ingenious practical books, on the other;"—to present a clear investigation of the leading principles of mechanics, with suitable examples, in a shape adapted to those persons "whose mathematical knowledge and time for study are limited by the claims of other pursuits." Let us endeavour to discover what success has attended the author's attempt.

The division of the subject adopted is, "1. The parallelogram of forces. 2. The conditions of equilibrium of forces acting on a point. 3. The conditions of equilibrium of forces acting on different points of a rigid body. 4. The mechanical powers. 5. The nature of friction. 6. The centre of gravity." Considering the many and powerful helps an author may command, one cannot help feeling that to treat these several heads with clearness and conciseness is not a very difficult undertaking. But it is, nevertheless, one which requires the exercise of considerable care; of more, apparently, than the present author has bestowed upon it, as it is our duty to show. For instance, on page 1, line 8, he writes: "If a stone rest on the ground, the pressure of the ground destroys its motion. This pressure is, therefore, a force." Now, we submit that this is not a happy manner of addressing even the most precocious national schoolboy in the land; while to duller urchins the words must be perfectly unintelligible. To tell a boy, at the outset of his study of a science, that the pressure of the ground *destroys* the motion of a stone *at rest*, is enough either to drive him to despair, or to excite him to an instinctive and rebellious use of the argument *ab impossibili*. If the definition immediately preceding the paragraph quoted be also given in connection with it, the matter is made still worse; the two together read thus:

"Force is any cause which tends to produce or to destroy motion in a body.

"If a stone rest on the ground, the pressure of the ground against the stone destroys its motion. This pressure is therefore a force."

There is a striking incongruity between the definition and its illustration, both logically and literally, and one that would be particularly puzzling to the learner. Moreover, the definition is incomplete; the same form of it being preserved, it should read, "Any cause which produces or destroys, or which tends to produce or to destroy motion in a body, is called force." And the illustration should evidently be put in the following, or a similar manner: "If a stone rest on the ground, the action of the ground against the stone tends to produce motion in the latter, but is resisted by the weight. This action of the ground is therefore a force."

The principle of the parallelogram of forces is proved according to *Duchayla's method*, but is confined to cases in which the forces are commensurable, although the limitation of the proof is nowhere hinted at. This we think very objectionable: especially as it is frequently assumed, in the course of the book, that the learner is acquainted to some extent with Euclid, trigonometry, and algebra, and may therefore be considered to have a knowledge of the existence of incommensurable quantities. In fact, it is highly improper to ignore the extension of the proof, and proceed as if the principle were established without it.

The author's chapter on Friction is by no means remarkable for its accuracy. It opens with the following novelty:

"Among the forces in nature, friction is one of the most general. It is called into action *whenever two bodies are brought into contact;*" and proceeds, "Thus an effort is required to push a table along the floor on which it stands. In fact, the floor resists the tendency of the table to slide along it. This resistance is the force of friction. *The direction of the resistance is always opposite to that in which we push.*" We have italicised the last sentence, in order to draw attention to it, as an example of the author's carelessness. It is of course quite true, that if we push from east to west the friction acts from west to east, &c. &c., and may therefore, in one sense, be said to act in a direction opposite to that in which the pushing is exerted; but it is wrong to trouble learners with expressions capable of readily misleading them, as that we have pointed out evidently is, for it is plain, that while friction always acts parallel to the surfaces of contact, the *pushing* may be exerted in an infinite number of inclined directions.

Again, the author says, "In fact, we mean the same thing, whether we use this phrase" ("bordering on motion"), "or whether we say the whole friction is called into play." This is not strictly true. Everybody knows

that the whole friction is called into play not only when the body is *bordering on motion*, but also when it is actually *in motion*.

As we do not purpose to proceed into the remainder of the chapters, we will point out a strange contradiction that occurs in this. The present author, like several others who have volunteered their explanations of mechanical principles, seems to have imperfectly comprehended the exact nature of the difference that exists between *friction of quiescence* and *friction of motion*, and consequently to have neglected it improperly. On page 19 he states, that the friction increases with the pressure which presses the two surfaces together perpendicularly; and on page 20, in explaining what is meant by the "limiting angle of resistance," he shows that the friction increases as the constant force exerted upon it is more and more inclined to the perpendicular; that is, of course, as the resolved perpendicular portion of it *decreases;* thus leaving the hapless pupil to take his choice of two contrary statements. The author should not have omitted to state, that while one body continues at rest upon another, the friction between their surfaces is always equal to that force, or resolved portion of a force which, acting parallel to the surfaces, tends to move one along the other; and that all the perpendicular force has to do in the matter is to determine the *limit* of the friction.

In conclusion, we may express our opinion, that with more care the author, preserving the arrangement and method of treatment adopted in this book, may yet produce another calculated to answer the end he has proposed to himself.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Clarke, William Henry, of Great Marlborough-street, Middlesex, peat and manure-merchant. *Improvements in the manufacture of a composition resembling "papier maché" and "carton pierre," and applicable to the same purposes to which "papier maché" and "carton pierre" are applied; parts of which invention may also be applied to the construction of ships and boats and roofing.* (A communication.) Patent dated August 2, 1853. (No. 1804.)

This invention consists in disengaging the vegetable organic matter of peat or turf from the earth, sand, and other such substances by trituration, &c.

Quinche, Antoine Joseph, of Paris, France, and of Holborn, City, London. *An improved apparatus for measuring distances travelled over by vehicles.* Patent dated August 2, 1853. (No. 1805.)

This apparatus is chiefly composed of clockwork, fixed in a conspicuous position on the vehicle. The anchor escapement of this clockwork receives a pendulous motion by a lever, which is actuated by a cam, boss, or eccentric, placed on the nave or on the axle of one of the wheels of the vehicle; and the clockwork is thus set in motion, and indicates the number of revolutions made by the said wheel on a dial.

Fontainemoreau, Peter Armand Lecomte de, of South-street, Finsbury, London. *An improved mode of regulating the electric light.* (A communication.) Patent dated August 2, 1853. (No. 1806.)

This apparatus is so constructed that its parts, when suspended, do not form any shadow underneath. It is composed of a wooden cylinder, at each extremity of which are set two brass rings a little apart, and adjusted so as to turn freely. Each of these rings is provided with a small brass pillar, having a slide at the top for the electrodes to move in. At each of the outer extremities of the grooves a small pulley is set, over which a cord passes, and at each of the inner extremities of the slides, another pulley is set, serving to cause the electrodes to bear on the grooves, and direct them regularly towards each other.

Boura, Matthias Edward, of Crayford, Kent, India-rubber manufacturer. *Improvements in supplying ships or other vessels with water, air or ballast.* Patent dated August 2, 1853. (No. 1808.)

The inventor gradually introduces into bags placed in a ship's hold a sufficient quantity of water to compensate for the absence of cargo while the cargo is being discharged. He says, "The bags can be removed from the hold, or wherever else they may be stowed away, and being filled with water, and attached to the timbers or spars of which a raft is composed, form a means of keeping the raft steady."

Daniel, Joseph Clisild, of Bath. *An improvement or improvements in preparing food and litter for cattle, pigs, and other animals.* Patent dated August 3, 1853. (No. 1811.)

This invention consists in causing grass, clover, and other such matters to be cut into chaff, or short lengths, and to be subjected when in a dry and brittle state to the action of a suitable mill, to be crushed and ground.

Slack, John, of Manchester, Lancaster, manager. *Improvements in reeds for looms.* Patent dated August 3, 1853. (No. 1812.)

This invention consists in so arranging the reeds that spaces greater than the distances between the dents are obtained

through a portion of the width of the reed. This is accomplished by using dents of two different widths, and arranging them alternately, so that when adapted to the loom the edges of them form two lines, the one projecting beyond the other, either at the back only, or at front and back.

RODEN, WILLIAM SARGEANT, of Ebbw-vale Iron-works, Monmouth, gentleman, and WILLIAM THOMAS, of Ebbw-vale Iron-works, same county. *Improvements in rolling metals.* Patent dated August 3, 1853. (No. 1815.)

This invention was described at length in our last number.

MACINTOSH, JOHN, of Pall-mall, Middlesex. *Improvements in the construction of bridges, viaducts, and other like structures.* Patent dated August 3, 1853. (No. 1816.)

This invention consists in combining a series of bow and string arches into one girder or beam, in such manner that each bow or arch springs from the crowns of the two bows or arches to which it is connected.

BILLINGS, JAMES, of Luton-place, George-street, Greenwich. *Improvements in roofing buildings.* Patent dated August 3, 1853. (No. 1818.)

This invention consists in causing the inclined bearers to be formed with inclined supports for receiving the ends of the tiles or plates in such manner that there is a space left between the succeeding tiles or plates, up a roof, in order to admit of the free passage of air; and to keep out the wet, the upper edge of each tile or plate is turned upwards.

HICKSON, WILLIAM, of Carlisle, Cumberland, gentleman. *Improvements in canal and river navigation, and in vessels to be used in such navigation, and in the mode of propelling the same.* Patent dated August 4, 1853. (No. 1820.)

The principal feature of this invention may be seen from the following extract from the inventor's specification :

"Instead of transhipping goods, &c., from canal boats and railway trucks into river barges, and *vice versâ*, I transfer the canal boats or railway trucks, together with their cargoes *en masse*, to or from a river barge, constructed to carry one or more canal boats, or an indefinite number of railway trucks, by the single or several combined agencies of a syphon and an hydraulic apparatus, or by a system of compressing or condensing the air, in conjunction with a series of iron tanks or pontoons."

SNELL, CHARLES HILL, of the Triangle, Hackney, Middlesex, chemist. *Improvements in the manufacture of soap.* Patent dated August 4, 1853. (No. 1821.)

Claims.—1. The fitting of soap in a pan or boiler, constructed and arranged with a peculiarly formed grating. 2. The mode or process of manufacturing soap by mixing the dextrine with the soap after it has been subjected to the operation of fitting.

ARMITAGE, GEORGE, of Bradford, York, dyer. *Improvements in the construction of presses.* Patent dated August 4, 1853. (No. 1822.)

This invention relates to hydraulic presses. The inventor uses bent pipes, having one end attached to the packing boxes, and the other end working through a stuffing-box into a cistern or receiver, the length of each pipe below its stuffing-box corresponding to the height the fellow packing-box rises. By this contrivance he proposes to prevent leakage and strain on the joints.

CLOUGH, CHARLES BUTLER, of Tyddyn, Flint. *Improvements in machinery or apparatus for washing, scouring, cleansing, or steaming woven fabrics, either in the piece or garment; also felts or fibrous substances, and corn, roots, seeds, or similar matters.* Patent dated August 4, 1853. (No. 1823.)

Claims.—1. A method of cleansing goods by passing steam or hot water on them during the revolution of a barrel or other vessel on its axis. 2. The use of a barrel or other vessel, with the addition of a loose roller or rollers, or of a ball or balls, or of a grated or perforated division inside of it. 3. A peculiar method of fixing the said vessel in a case, either horizontally or perpendicularly. 4. A method of effecting the same objects by means of a plunger or plungers acting on the goods in a vessel in conjunction with steam or hot water.

RODEN, RICHARD BROWN, of Abersychan Iron-works, near Newport, Monmouthshire. *Improvements in rolling iron and all other malleable metals and alloys.* Patent dated August 4, 1853. (No. 1824.)

This invention relates to those rolling mills in which what are called "three-high rolls" are used, and consists in causing the middle roller to remain stationary as to position, and in moving or adjusting the upper and lower rollers to or from the middle roller, to which the power for driving the rolls is applied, so that heavy pieces of metal may be readily rolled with three rollers.

MOSS, THOMAS, of Gainford-street, Islington, Middlesex. *Improvements in printing bank-notes, cheques, bills of exchange, and other documents requiring like security against being copied.* Patent dated August 4, 1853. (No. 1825.)

This invention has for its object the providing greater security against documents being copied by anastatic or other processes, and consists of printing the document in the ordinary manner, and printing the same surface with a device more or less extensive,

with transparent ink after or before the other impression is made.

FLECHELLE, BARTHELEMY LOUIS FRANÇOIS XAVIER, gentleman, of Paris. *Certain improvements in the means of carrying, bedding, and bathing the injured, ill, or invalid persons.* Patent dated August 4, 1853. (No. 1826.)

This invention consists of a litter for carrying wounded or sick persons, which is constructed of an iron frame, capable of folding in the centre of its length, and also jointed, so as to be capable of being folded or separated into two parts in the direction of its breadth. It has at each corner a handle, by which it is carried, all of which, when the litter is placed on the ground, turn down, and form legs. It is formed so that the middle part slides out, and part of it is capable of being set on inclination.

WILSON, GEORGE FERGUSSON, of Belmont, Vauxhall, Surrey, managing director of Price's Patent Candle Company, and ALEXANDER ISAAC AUSTEN, of Trinity-place, Wandsworth-road, Surrey, engineer. *Improvements in the apparatus used in the manufacture of mould candles.* Patent dated August 4, 1853. (No. 1827.)

The inventors cover and protect the glass tubes with gutta percha, either by wrapping and moulding around them a piece of sheet gutta percha, and using heat to join the edges together, or by enclosing the glass pipe in a piece of gutta percha tube of the requisite size, and applying heat, so as to enable the one end to be moulded about the tip of the glass, and so as to apply the gutta percha firmly to the glass in all parts; or they draw over the glass tubes a piece of vulcanized India-rubber tube of the necessary size; or they cover the tubes with a composition capable of being applied in a partially fluid or pasty state, and of hardening into a more or less firm body when dry.

LALLEMAND, JOSEPH, of Besançon, France, chemist. *The manufacture of paper from peat.* Patent dated August 5, 1853. (No. 1828.)

The inventor first washes the peat thoroughly, in order to separate all the earthy from the fibrous portions, and places these latter in a bath of caustic ley. After a lapse of some twenty-four hours, or more or less, according to the strength of the ley, the fibres are removed, and are then placed for about four hours in a bath acidulated with hydrochloric acid, and kept constantly agitated. The fibres are next washed in fresh clear water, and are then subjected to a bath containing a small quantity of alum. The fibres are then bleached in a chlorine vat, and are mixed with from 5 to 10 per cent. of rag pulp. The fibres and pulp are then placed in an ordinary pulping engine, and go through the remaining processes usually followed in the manufacture of paper.

SMITH, WILLIAM, and THOMAS PHILLIPS, of Snow-hill, Middlesex, gas engineers. *An improved boiler.* Patent dated August 5, 1853. (No. 1829.)

This improved boiler consists of a number of concentric hollow cylinders, in which a very thin body of water is constantly exposed to the action of the heat. In the interior of the boiler a vacuum or air-chamber is formed, which consists of a cylinder of copper, or other metal, closed at both top and bottom, and made air and water-tight, and is so placed that no water can enter it.

SMITH, WILLIAM, and THOMAS PHILLIPS, of Snow-hill, Middlesex, gas-engineers. *An improvement in gas-stoves.* Patent dated August 5, 1853. (No. 1831.)

This invention consists in forming a stove in which are produced the appearance and effect of an ordinary coal fire from jets of gas radiating upon lumps of glass, or lumps of glass and metal ore laid upon a piece of plate glass in the bottom of the stove. The reflection from these lumps is shown through plates of coloured glass arranged between the bars in front of the stove, and thus presents the appearance of hot or burning coals.

NORTON, JAMES LEE, of Holland-street, Blackfriars, Surrey. *Improvements in obtaining wool from fabrics in a condition to be again used.* Patent dated August 5, 1853. (No. 1835.)

The object of this invention is to obtain the fibres of wool from rags or pieces of fabrics by subjecting the latter to the action of machinery in a moistened or saturated condition instead of in a dry state.

NEWTON, WILLIAM, of Chancery-lane, civil engineer. *Improvements in the process of coating cast-iron with other metals, and the alloys of other metals.* (A communication.) Patent dated August 5, 1853. (No. 1836.)

This invention consists,—1. In coating cast-iron permanently with copper, by depositing the copper by galvanic action from a solution prepared by first taking a saturated solution of sulphate of copper in water, and precipitating with carbonate of potash, and then re-dissolving in cyanide of potassium, whether the copper be deposited directly on the surface of the cast-iron, or on zinc previously deposited thereon. 2. In coating cast-iron with brass, by first coating the cast-iron with copper or zinc, or with both, and then depositing the brass thereon by galvanic action from a solution formed by mixing with the solution of copper employed in the first part of the invention, a solution of zinc prepared in substantially the same manner.

Hughes, John, of Great George-street, Westminster, civil engineer. *Improvements in building or forming structures under water or below the surface of the ground.* Patent dated August 6, 1853. (No. 1838.)

The chief feature of this invention consists in the use of a hollow vessel, which the inventor calls a shoe, open at the bottom, and within the interior of which he excavates sand or other material forming the ground.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

Anderson, William Lanphir, of Norwood, Surrey, gentleman. *An improved propeller, and method of driving the same.* Patent dated August 2, 1853. (No. 1803.)

This propeller consists of a paddle, mounted on a shaft on which is a ball, which works through a socket in the ship's side. Through the ball and paddle-shaft a slot is cut, into which a pin, passed through the rims of the socket, enter, and thus preserves the ball and shaft in a vertical or other desired position. The paddle-blade of the propeller is fixed into a socket, which is continued outward from the ball, or is attached as one piece to the shaft.

Raymond, Mead Terry, of Clement's-lane, Lombard-street, London, general commission-agent. *Improvements in apparatus for retarding and stopping trains of carriages on railways.* Patent dated August 2, 1853. (No. 1807.)

This invention has for its object the interposition of a carriage between the locomotive engine and the train of carriages, in order to carry breaks and apparatus, acting by elasticity, in such manner that the breaks will ordinarily be applied to the wheels when the train is at rest, and removed when the locomotive engine has moved to a certain distance in advance of the train, "so that should the locomotive, after being in motion, be stopped, whether by accident or otherwise, the apparatus, acting by elasticity, will cause the breaks of the interposed carriage to be put on."

Richardson, George, of Gutter-lane, Cheapside, London, gas-fitter. *Improvements in stoves for warming or heating buildings.* Patent dated August 2, 1853. (No. 1809.)

In applying Mr. Richardson's invention to gas-stoves, the burner is placed at the lower part, as usual, and is enclosed within a cylindrical or other case, made by preference of some earthen material. This case is provided internally with one or more horizontal discs or plates, which are supported on edges one above the other at suitable distances apart, and are perforated or scolloped out at the edges, for the purpose of causing the heated air and gases from the burner to pass in contact with and beat the cylinder or case, which will, by radiation, give off its heat to the surrounding atmosphere.

Atkins, Thomas, of Oxford, civil engineer. *Improvements in transmitting power and communicating motion to agricultural implements.* Patent dated August 3, 1853. (No. 1810.)

The inventor surrounds a grooved wheel, that is in connection with the prime mover, with an endless cord, stretched to a proper tension, and attaches this to a frame, termed by him a rope-cart, or carrier, which is provided with pullies, wheels, and other mechanism, arranged so as to secure a steady strain for keeping the rope at a proper tension.

Newton, William Edward, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for cutting cardboard, paper, and other similar materials.* (A communication.) Patent dated August 3, 1853. (No. 1818.)

The patentee mounts the book or paper-holder on a centre, so that it may be turned round and made to assume either of the three positions in which it requires to be placed, in order that the three edges of the book or paper may be arranged and trimmed by a single adjustment of it in the holder.

Servan, Aristide Michel, of Philpot-lane, London. *Improvements in the manufacture of soap.* Patent dated August 3, 1853. (No. 1817.)

In carrying out this invention glass is reduced to a coarse powder, and mixed with two or three times its weight of soda and a small quantity of potash; the whole is then melted, poured out, and allowed to cool; after which it is dissolved in water and a fatty body; such is added to form the soap, the saponification being effected by the alkali originally in the glass in conjunction with that subsequently added, and the silica being deposited in the soap in a state of fine division.

Cumming, John, of Glasgow, Lanark, North Britain, pattern designer. *Improvements in printing shawls, handkerchiefs, piece-goods, paper-hangings, and similar materials, and in the apparatus connected therewith.* Patent dated August 3, 1853. (No. 1819.)

The chief object of this invention is to do away with the necessity of engraving or otherwise producing numerous repetitions of the pattern upon the rollers employed in printing the goods mentioned in the title; and the invention consists in printing the entire piece from small rollers, or segments of rollers, containing but one or two repetitions of the pattern.

Peters, Richard, of Southwark, Surrey,

engineer. *An apparatus or machine for ascertaining the distance traversed by cabs and other vehicles.* Patent dated August 5, 1853. (No. 1830.)

This invention consists in having at the side of the vehicle a vertical or bell-crank lever, which receives motion at the lower end, by means of a horizontal connecting-rod from an eccentric on the inside of the boss or nave of the carriage-wheel, and gives motion at the upper end to a ratchet-wheel on a spindle in an indicator box, and as the vehicle progresses registers the revolutions.

BELLHOUSE, EDWARD TAYLOR, of the Eagle Foundry, Manchester, Lancaster, engineer. *Improvements in fire-proof structures.* Patent dated August 5, 1833. (No. 1832.)

This invention relates to a method of constructing fire-proof floors and other parts of buildings; the principal feature of the method consists in the employment of corrugated plates of iron.

GARFORTH, WILLIAM, and JAMES GARFORTH, of Dukinfield, Chester, engineers. *Improvements in machinery or apparatus for manufacturing bricks.* Patent dated August 5, 1853. (No. 1833.)

The inventors employ a steam engine, and to the reverse end of the piston-rod is attached a second piston, which works in a second cylinder, in which the clay is placed, and at the other end of which are fixed the disks or moulds through or into which the clay to form the bricks is to be pressed.

HUNT, ROBERT, of Cottage-place, Greenwich, Kent, gentleman. *An improved tile, and an improved method of making tiles.* Patent dated August 5, 1853. (No. 1834.)

The improved tile is a flat and thin slab of burnt clay of any suitable temper or mixture, and made in imitation of split slate; this effect is obtained by forming the tiles in groups of various numbers, and drying and burning them in compact blocks capable of being afterwards separated.

JUST, MARTIN ZADICK, of Manchester, merchant. *Improvements in machinery for hulling and dressing paddy or rice.* (A communication.) Patent dated August 6, 1853. (No. 1837.)

This invention consists in causing the paddy or rice to pass between two rollers placed horizontally, or nearly so, and covered with very thick leather, as sea-horse hide, or other suitable material. The circumferences of the rollers revolve at different velocities, and by this means the paddy or rice is hulled and dressed in passing between them. Beneath the rollers is placed a fan for causing a current of air to separate the husks from the rice.

PROVISIONAL PROTECTIONS.

Dated January 25, 1854.

185. Edward Batten Walmsley, of Middle Mall, Hammersmith, Middlesex, iron-merchant. Improvements in utensils, implements, and apparatus for the purposes of lighting, heating, and cooking.

189. Richard Archibald Brooman, of 166, Fleet-street, London, patent-agent. A new and improved fluid for illuminating purposes. A communication.

191. James Anderson, of Auchnagie, Perth, North Britain, farmer. Improvements in obtaining motive power.

Dated January 26, 1854.

193. Thomas Wicksteed, of Leicester, civil engineer. Improvements in the manufacture of sewage-manure.

195. Francis Mollett Blyth, of Norwich, engineer. Improvements in the mode of heating water for steam boilers.

197. Sydney Smith, of Hyson Green Works, near Nottingham. Improvements in valves or apparatus for regulating the passage and supply of fluids.

199. George Firmin, of Bath, Somerset, contractor. Improvements in anchors.

Dated January 27, 1854.

200. François Ferdinand Rohart, chemist, of Sotteville les Rouen, France. Improvements in the preparation of a certain substance for clarifying liquids.

201. Patrick Moir Crane, of Canonbury-villas, New North-road, Islington, Middlesex, gentleman. An improvement in the manufacture of iron.

202. Alphonse Cajetan de Simencourt, of Paris, France. Improvements in composing and distributing type.

203. William Church, of Birmingham, Warwick, civil engineer, and Samuel Aspinwall Goddard, of Birmingham aforesaid, merchant and gun-manufacturer. An improvement or improvements in ordnance.

204. Henry Tendall, of Hoxton, engineer, and William St. Clair Trotter, of London. Improvements in machinery and apparatus for crushing, washing, and amalgamating auriferous quartz and other ores.

205. Thomas Thurlby, of Guildford-street East, Spa-fields, Middlesex. Improvements in the means of effecting instant communication between distant points of railway trains.

206. William Palmer, of Brighton, Sussex. Improvements in the manufacture of materials for, and in constructing houses and other buildings.

207. William Partington, of Bolton-le-Moors, Lancaster, engineer. An improved construction of safety-valve for steam engines.

208. Joseph Atkinson, of Richmond-grove, Middlesex, engineer. Improvements in thrashing-machinery.

Dated January 28, 1854.

210. John Grist, of the New North-road, Islington, Middlesex, engineer. An improved break for railway and other carriages.

212. Josiah Latimer Clark, of Chester-villas, Canonbury-park, Islington. Improvements in apparatus for conveying letters or parcels between places by the pressure of air and vacuum.

214. David Chadwick, of Salford, Lancaster, gentleman, and George Hanson, formerly of Huddersfield, York, but now of Manchester, Lancaster, plumber. Improvements in metres for measuring water or other liquids, and vapours or gas.

216. William Garnett Taylor, of Norfolk-terrace, Westbourne-grove, Middlesex, Esq. Improvements in certain parts of machines employed for preparing and spinning cotton, wool, hair, silk, flax, and other fibrous substances or materials.

218. William Redgrave and Thomas Redgrave, of Bow-street, Covent-garden, Middlesex. New railway signal-lights, to be called "Redgrave's Patent Railway Signal-light."

Dated January 30, 1854.

220. Peter Armand Lecomte de Fontainemoreau, of South-street, Finsbury, London. Certain arrangements for preventing accidents on railways. A communication.

222. William Phillips, of Birmingham, Warwick, gentleman. Improvements in the manufacture of coffins.

224. Benjamin O'Neale Stratford, Earl of Aldborough, of Stratford-lodge, Wicklow, Ireland. Improvements in aerial navigation.

226. Richard Garrett, of Leiston Works, near Saxmundham, Suffolk. Improvements in thrashing-machines.

228. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the manufacture or production of gas, and in the application of the materials employed therein. A communication from Andre Koechlin, Napoleon Joseph Vicomte Duchatet, and Joseph Antoine Auguste de Perpigna.

Dated January 31, 1854.

230. Thomas Cox, of Wolverhampton, Stafford, clothier's assistant. An improvement or improvements in buttons, and in attaching the same to articles of dress.

232. Edward William Kemble Turner, of Praed-street, Paddington, Middlesex. Treating gold and other ores.

234. Luthur Young, of Bow-lane, Cheapside, and Edwin Marten, of Louisa-street, Stepney. Improvements in apparatus for regulating the pressure and supply of gas.

236. Isaac Hazlehurst, of Ulverstone, Lancaster, iron and steel-manufacturer. Improvements in the manufacture of iron by blast, and in the construction of furnaces and machinery for the same.

238. Louis Christian Koeffler, of Rochdale, Lancaster, bleacher and dyer. Certain improvements in machinery or apparatus for preparing, dressing, and finishing yarns or threads.

240. William Wright and George Brown, of the firm of Wright and Brown, of Newcastle-upon-Tyne, iron-founders. Improvements in cupolas, which improvements are also applicable to smelting and other furnaces.

242. William Malam, of Blackfriars-road, Surrey, gas-engineer. Improvements in apparatus for the manufacture and holding of gas.

244. Philibert Beudot, of Boulevart St. Martin, Paris, France. Improvements in gas-burners.

Dated February 1, 1854.

246. Claude Bernard Adrien Chenot, of Paris, Boulevart St. Martin, France. Improvements in accumulating, conducting, and treating gases of combustion, and also in generating and applying the same to metallurgic and other purposes.

248. Augustin Mortera, machinist, of Paris, France. Improvements in apparatus for stopping locomotive engines, wagons, or other vehicles on railways.

250. John Burgum, of Birmingham, Warwick, engineer. A new or improved self-acting damper for the furnaces of steam boilers.

254. Charles François Le Page, literary man, of Paris, France. Certain improvements in apparatus for lighting.

256. Alfred Daniel, of Moorfields, Dudley-road, Wolverhampton, Stafford. Improvements in locks and handles for the same.

258. John Dewar Morrison, of Sunderland, Durham, smith. Improvements in winches.

Dated February 2, 1854.

260. Thomas Atkins, of Oxford, civil engineer. Improvements in transmitting power and communicating motion to implements for agricultural and other purposes.

264. James Stevens, of Darlington Works, Southwark-bridge-road. Improvements in apparatus for giving railway signals.

266. Frederic Henry Sykes, of Cork-street, Piccadilly, Esq. An improved apparatus for supplying or feeding boilers with water, applicable to raising and forcing liquids for other purposes.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

252. Francis Herbert Wenham, of Effra Vale Lodge, Brixton, Surrey, engineer. Improvements in fire-arms. February 1.

286. Robert James Maryon, gentleman, of York-road, Lambeth, Surrey. Certain improvements in the machinery for the improved construction of windlasses and other machines for which the same invention is applicable. February 6.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," February 10th*, 1854.)

2048. Lemuel Wellman Wright. Improvements in reaping and gathering-machines.

2054. Alfred Somerville and Charles Twigg. Improvements in pen-holders, and which said improvements are applicable to the manufacture of umbrella and parasol-sticks, cornice-poles, and other such like articles.

(*From the "London Gazette," February 14th*, 1854.)

2068. James Coate. Improvements in tooth, nail, and hair brushes.

2119. James Hill Dickson. Improvements in machinery or apparatus for the preparation of flax and similar fibrous material.

2128. John Timmis. Improvements in safety-valves for boilers.

2184. Henry Needham. Improvements in revolving fire-arms.

2235. Peter Armand Lecomte de Fontainemoreau. Improvements in treating certain exotic plants for the production of a fibrous substance, known in commerce by the name of vegetable silk. A communication.

2280. William Littell Tizard. Improvements in thermometers and other like indicators.

2281. John Milner. Improvements in steam engines.

2314. Robert James Maryon. Improvements in the construction of anchors.

2332. William Muir Campbell. Improvements in earthenware kilns.

2347. James Higgins and Thomas Schofield Whitworth. Improvements in machinery or apparatus for spinning and doubling fibrous materials.

2353. William Muir Campbell. Improvements in potters' or earthenware kilns.

2411. Robert Shaw. Improvements in writing-instruments.

2415. James Barton. Improvements in fittings for stables.

2465. William Bottomley. Improved machinery for hand and power-loom weaving, and especially applicable to weaving figured fancy and checked goods with any number of picks, by Jacquard engines.

2521. John Crowley. Improvements in the construction of ovens and furnaces.

2537. Henry Tylor. An improved chair bedstead.

2666. John Banfield. A double-acting railway-signal, for preventing collisions or accidents on railways.

2703. Robert Jamieson Sibbald. An improved mode of communicating from vessels to the shore, or from one vessel to another.

2771. John Carter Ramsden. Improvements in apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.

2780. James Alexander Manning. Improvements in the treatment of sewerage and other polluted liquids, and the products thereof.

2905. Eugene Hippolyte Rascol. Improvements in retorts for the manufacture of gas. A communication.

2956. Josiah Latimer Clark. An improvement in insulating wire used for electric telegraphs, with a view to obviate the effects of return or inductive currents.

2965. R. B. Huygens. Improvements in machinery for crushing, washing, and amalgamating gold and other ores and substances.

2995. Thomas Williams Makin. Improvements in machinery or apparatus for finishing woven fabrics.

45. Benjamin Burleigh. Improvements in railway switches and chairs.

67. Felix Lieven Bauwens. Improvements in treating fatty matters, previous to their being employed in the manufacture of candles.

122. Charles Howard. Improvements in the manufacture of iron.

142. Robert Angus Smith and Alexander M'Dougall. Improvements in treating, deodorising, and disinfecting sewage and other offensive matter, which said improvements are also applicable to deodorizing and disinfecting in general.

155. Charles John Edwards. Improvements in the manufacture of bands for driving machinery.

157. Charles Clarke Armstrong and William Pursall. A new or improved percussion-cap.

166. John Getty. Improvements in the manufacture of tubular bridges, part of which improvements is applicable also to the preparation of plates for covering iron ships, for constructing boilers, and for other analogous uses.

171. Richard Archibald Brooman. Improvements in machinery for sawing stone and marble. A communication.

178. John Ridgway. Certain improvements in the method of generating and applying heat to kilns, ovens, and furnaces, for manufacturing purposes.

180. William Massey. Improvements in artificial teeth and gums.

189. Richard Archibald Brooman. A new and improved fluid for illuminating purposes. A communication.

197. Sydney Smith. Improvements in valves or apparatus for regulating the passage and supply of fluids.

198. Samuel Slack Stallard. Improvements in the manufacture of knit fabrics.

204. Henry Tendall and William St. Clair Trotter. Improvements in machinery and apparatus for crushing, washing, and amalgamating auriferous quartz, and other ores.

205. Thomas Thurlby. Improvements in the means of effecting instant communication between distant points of railway trains.

206. William Palmer. Improvements in the manufacture of materials for, and in constructing houses and other buildings.

212. Josiah Latimer Clark. Improvements in apparatus for conveying letters or parcels between places by the pressure of air and vacuum.

226. Richard Garrett. Improvements in thrashing machines.

242. William Malam. Improvements in apparatus for the manufacture and holding of gas.

252. Francis Herbert Wenham. Improvements in fire-arms.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed February 10, 1854.

1860. Jean Pierre Albert Galibert.
1889. Thomas Allan.
1931. David Harkes.
1977. William Austin.

Sealed February 11, 1854.

1867. Joseph Bacon Finnemore and Edwin Daniel Chattaway.
1878. Samuel Adams.
1880. James Strong.
1881. Thomas Turner and John Field Swinburn.
1887. Richard Archibald Brooman.
1888. William Littell Tizard.

Sealed February 13, 1854.

1895. Frederick Lipscombe.
1900. John Gwynne.
1902. John Gwynne.
1906. Hesketh Hughes.
2037. Thomas Walker.
2202. James Grafton Jones.
2514. George Hamilton.
2726. James Dilks.
2825. Thomas Storey.
2848. Benjamin Solomons.
2906. Samuel Messenger.

Sealed February 16, 1854.

1916. John Atherton and James Abbott.
1917. Peter Foxcroft.
1918. George Richardson.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

N. B.'s reply to Mr. Lipscombe's letter will be inserted, if possible, in our next.

A. London.—We recommend you to look over the subject of your letter again, as it cannot be inserted in its present form. How can T (the tension) = sin θ? Beside, you have neglected several important facts, and thus arrive at false conclusions.

J. Dunbar and *E. E. H.*—Yours are received with thanks.

Δ.—We do not understand your question in its present form.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Proprietor's Names.	Addresses.	Subject of Design.
Jan. 19	3553	Batty and Co.	Leadenhall-street	Jar and cover.
20	3554	H. Greaves	Birmingham	Portmanteau.
23	3555	Waterloo and Sons	London Wall	Envelope.
,,	3556	H. Hill and R. Millard	Duncannon-street	Writing-case.
28	3557	P. Arkell	Brixton-hill	Manger.
31	3558	P. Wagenmam	Bonn, Prussia	Lamp.
Feb. 2	3559	I. Cheek	Oxford-street	Hook-spinning bait.
3	3560	Walsh and Brierley	Halifax	Waistband clasp.
4	3561	W. Oxley and Co.	Manchester	Flyer-washer.
7	3562	H. T. Boden	Birmingham	Tooth-brush.
13	3563	W. Aston	Birmingham	Button.

LIST OF PROVISIONAL REGISTRATIONS.

Jan. 16	555	T. Lavender	Goswell-road	Cinder-sifter.
19	556	Carl Von Berg	Bath-street	Miniature-case catch.
20	557	J. Stoker	Doncaster	Signal-break.
31	558	C. J. Recordon	Barnstable	Angle trisector.
Feb. 2	559	T. Groghegan	Jermyn-street	Raglan surtout.
8	560	G. Grace	Birmingnam	Screw-nicking machine.
,,	561	E. Aldis	North-street	Cramp.

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GOVER'S PATENT POLYTINT PRINTING-MACHINE.

Fig. 1.

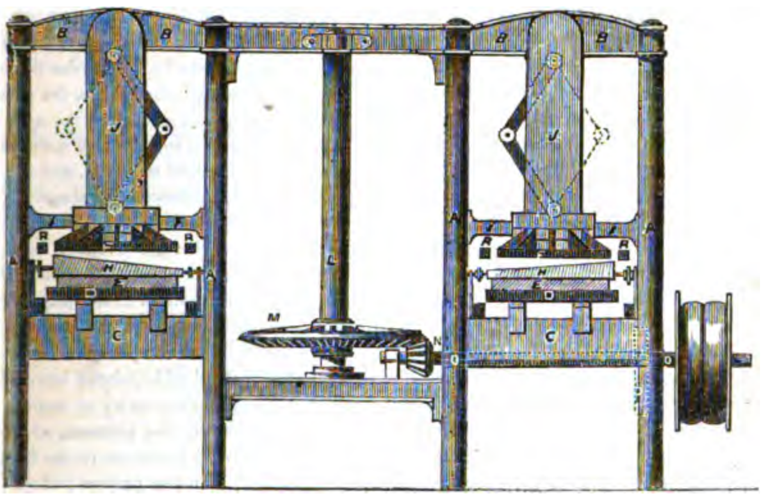
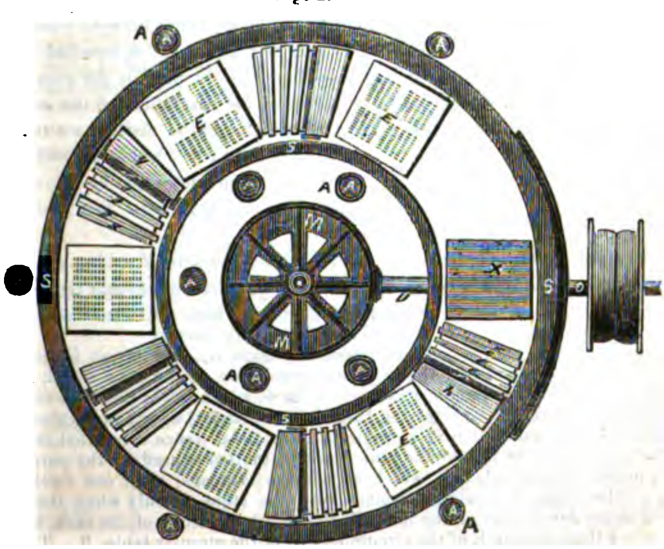


Fig. 2.



GOVER'S PATENT POLYTINT PRINTING-MACHINE.

(Patent dated October 21, 1852.)

THIS machine is designed to print a number of colours at the same time, and differs essentially from any hitherto constructed, both in principle and action. It consists of a series of plattens, or pressing surfaces, according to the number of colours in which it is desired to print, arranged equidistantly round a common centre, by means of which colours are printed simultaneously on a suitable number of sheets of paper, the sheets being moved successively from one block to another. Beneath the plattens are placed the blocks or surfaces to be printed from, each block being supplied with a different coloured ink by a suitable apparatus. There is also a rotating table, on which are fixed the tympans for carrying the paper, there being as many tympans as there are blocks. In order that each sheet of paper may, in succession, receive an impression from all the blocks, the rotating table, after each action of the plattens, carries the paper from each block to the next, and at each such action a perfect impression is withdrawn, which has successively received the various colours. The first block is then supplied with a fresh sheet of paper, and the previously supplied sheets of paper, still in the machine, are each advanced one stage.

Fig. 1 of the accompanying engravings is an elevation, partly in section of a machine having five plattens or pressing surfaces, so arranged that, with a blank space for laying on the paper, they are placed in six equidistant divisions around a common centre or shaft, from which they are actuated. A A are five pairs of cast-iron pillars or frames, carrying the top cross frames or beams, B B, and the lower frames or cross pieces, C C, upon which are fastened the beds of the press, D D, which receive the blocks or plates to be printed from. The plattens, F F, are so arranged that, by means of the double-jointed levers, G G, they may be sufficiently raised from the blocks, E E, to admit of the series of conical inking-rollers, H H, passing over the blocks, E E, without touching the plattens, which are kept in their places by working between two grooved end bars, I I, cast on to the framing, A A, and made tight by the usual means adopted in hand printing presses; the tops of the double levers, G G, are attached to joints fixed in the underside of the cross heads or frame, B B, not shown in the engraving, and the lower joints are fixed between the slings, J J. The plattens are made to rise and fall by the levers being brought from their angular positions, as shown, to a straight line, by rods, *a a*, figs. 3 and 4, attached to the centre shaft; these rods being worked by friction-pulleys, *b b*, running in the grooves of a cam-wheel, K, and so arranged that during one-half of the revolution of the centre shaft, L, which carries the cam, the friction pulleys are quiet, and the plattens are raised from the blocks to admit of the inking-rollers passing to and fro over the blocks, and allow the circular table, which conveys the paper from one block to another, to be moved forward one division, in readiness for another impression. The arrangements just described are not seen in fig. 1.

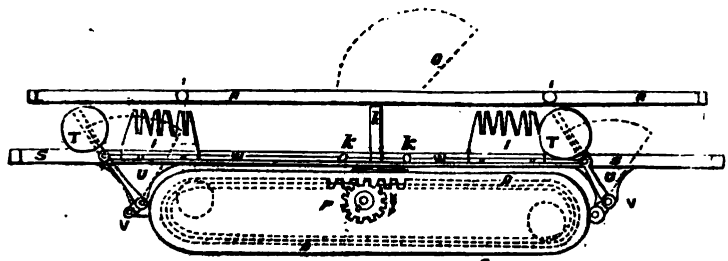
Fig. 2 represents the circular table which carries the sets of inking-rollers, *e e e*, and moves to and fro, the rollers being conical to suit the circular motion; the two rings of the circular table, R R, are united by means of stretching-bars, *f f*, the ductor, *g*, and inking surface, *k*, being constructed as is usual in printing-machines.

The centre shaft, L, has a bevel wheel, M, upon it, into which is geared a bevel-pinion, N, which revolves six times to one revolution of the bevel wheel, M; upon the shaft, O, is fixed another pinion, P, shown in fig. 5, which works inside of an endless rack, Q, and makes six revolutions to one to-and-fro movement of the rack, which has also an upward and downward motion of a small distance, the distance being that in excess of the diameter of the rack to that of the pinion, which motion is used for the purpose of giving motion to the circular table, R, which carries the tympans, *o*, in one direction only, by means of the catch, *h*, coming in contact with the stops, *i*, only when the pinion, P, is working in the lower part of the rack, Q, the length of stroke of the rack being equal to rather more than one-sixth of the circumference of the circular table, R. The same alternate motion of the rack is also used for giving motion to the inking-apparatus, which is

carried backward and forward a less distance than the sixth part of that circle, by the space left between the two projecting pins, *k k*, fixed in the rings of the circular table, which carries the inking-apparatus; *l l* are guide-forks attached to the rings, S S, of the circular table for carrying the inking-rollers.

The rack, Q, is not attached to the rings, S S, but works in a separate frame, not shown in the engraving. It is counterbalanced by the weights, T T, at the ends of the levers, U U, so that at each end of its upward and downward motion, the weights act alternately on the sides of their fulcrums, V V; the levers, U U, are connected by a rod, *w*, to ensure uniformity of action.

Fig. 2.



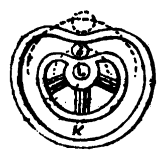


Fig. 3.

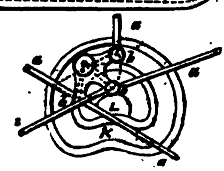


Fig. 4.

The printing-blocks are adjusted so as to obtain perfect registration without taking them off the beds of the press by means of adjusting screws, the points of which press against the frames, in which the blocks are fixed. The blank space, *x*, fig. 2, is for the purpose of enabling the workman to lay the sheets of paper on each tympan, and to take them off as the tympans come round in succession. In the first place, waste sheets will have to be fed in until they are full; clean sheets may then be fed, and continued until the waste sheets are emptied; the process then continues uninterruptedly, each sheet having five separate colours impressed upon it, according to the arrangement shown; but other numbers of colours may be produced at each movement of the circular table.

LONDON FIRES IN 1853.

Twenty-third Annual Report. By Mr. William Baddeley, C.E.

(*Concluded from page* 156.)

THE daily distribution of last year's fires was as follows:

Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Sunday.
146	116	147	115	125	127	124

Their distribution through the hours of day and night has been in the following proportion:

	First hour.	Second hour.	Third hour.	Fourth hour.	Fifth hour.	Sixth hour.	Seventh hour.	Eighth hour.	Ninth hour.	Tenth hour.	Eleventh hour.	Twelfth hour.
A.M.	63	36	45	40	38	15	12	21	14	23	23	24
P.M.	29	27	26	17	28	31	61	68	69	89	53	48

The *causes of fire*, so far as they could be satisfactorily ascertained, have been the following:

Accidents, unforeseen, and for the most part unavoidable	13
Apparel ignited on the person	7
Bleaching horsehair	1
„ nuts	2
Brimstone, melting	1
Candles, various accidents with	101
„ ignited bed-curtains	74
„ „ window-curtains	43
Carelessness, palpable instances of	18
Charcoal fires	2
Chemicals, explosion of by sun's heat	1
Chicory, roasting of	2
Children playing with candles	1
„ „ fire	6
„ „ lucifer-matches	8
Cinders put away unextinguished	9
Coke put away hot	1
Copper, improperly set	2
Fire-sparks	50
„ kindled on hearths	5
Fireworks, letting off	4
„ accidentally ignited	8
Friction of machinery	1
Flues, foul and ignited	35
„ defective or overheated	45
„ blocked up	9
„ of hot plate	5
Forge, heat from	1
Frying fish	1
Fumigation, incautious	1
Furnaces, heat of	16
Gas, escape of from defective fittings	65
„ „ „ street-mains	2
„ accidents in lighting	5
„ burning too high	14
„ fittings, repairing	1
Gunpowder, explosion of	2
Hearths, defective	2
„ laid in timber	2
Hot-air pipe	1
Intoxication	9
Lamps, oil	2
Lamps, naphtha	1
Lime, slaking	4
Linen, drying or airing before fire	39
Lucifer-matches, making	3
„ „ using	5
„ „ accidentally ignited	10
Locomotives, sparks from	2
Naphtha, vapour of igniting	1
Ovens, defective or overheated	6
Pitch and tar, boiling	6
„ burning off water-butt	1
Reading in bed	1
Shavings, loose, ignited	41
Smoking fish and meat	3
„ in bed	1
Spontaneous ignition of hay	13
„ „ lamp-black	7
„ „ nut-galls	1
„ „ oil-cake	1
„ „ oily saw-dust	3
„ „ „ rubbish	1
„ „ rags	3
Stills, illicit	2
Steam boilers, heat from	10
Stoves, improperly set, defective, or overheated	25
Stoves, drying	9
„ pipe	4
„ ironing	3
„ placed on floor	3
Suspicious	7
Tar-vessels, leaking	2
Tobacco, unextinguished	28
Turpentine-still, leaking	1
Varnish, waterproof solution, &c., heating of	5
Wax, melting of	1
Wilful	13
	834
Unknown	66
	900

Although the causes of fire do not, upon this occasion, present any marked feature of novelty, a careful perusal of the following details cannot fail to afford instruction. The wetness of the summer called for more care in the stacking of hay than, judging from the number of cases reported, would seem to have been exercised. Several expedients have long been known as preventives of fire in hay-ricks. Salt, sprinkled among the hay while being stacked, is said to prevent fermentation and ignition. A tunnel formed in the centre, from the bottom of the stack upwards, is also a safeguard. When no precaution has in the first instance been adopted, and danger is apprehended, it may still be avoided by boring, for which purpose an admirable instrument was exhibited at the Royal Agricultural Society's meetings, by Mr. Gillett, of Brailes, Worcestershire.

That lucifer matches continue to prove a fruitful source of accident is by no means surprising, considering the utter want of care shown in handling them. It is a common occurrence, when a match falls, to think it not worth stooping to pick up; or in attempting to ignite a damp one, which fails, to throw it down as useless—probably in a place where it soon dries and becomes easily inflamed. By and bye, a female or a child steps upon the match, which takes fire, causing much mischief, or, as in several recorded instances, loss of life! An accident of this kind caused at least one serious fire last year, when some young children, playing in a shop at mid-day, trod upon a fallen match, which, igniting, set fire to a quantity of papers, &c., beneath the counter, and the shop was instantly in such a blaze that some females, sitting at work in a room behind, escaped with great difficulty, and serious damage was done to the building and contents before the fire could be extinguished.

At a vestry meeting, on Easter Tuesday last, the parishioners of St. Mary, Islington, passed a resolution that, in future, no rewards should be paid to engine-keepers for attending chimneys on fire, as *no danger was to be apprehended therefrom;* but that, in cases of houses on fire, the full parliamentary reward should be paid. The *first part* of this resolution has been *honestly* carried out; the *second part* (shame to say) HAS NOT!

During the past year, in no less than 35 instances (several of them in Islington parish), has proof positive been afforded of the mistaken views of the Islington vestry upon this subject. It unfortunately very frequently happens that the mischiefs arising from unswept and ignited chimneys fall, not upon the neglectful parties themselves, but upon their innocent neighbours. In several recent cases of chimney fires, the firemen have been told there was "no danger," and refused admission to the premises; but in the course of a few hours, the building was found on fire, on two or more floors, and the firemen's aid was then most earnestly solicited.

One morning, in May last, the Insurance Companies were officially informed that a fire had been occasioned by "a bottle of *electric fluid* exploded by the sun's heat!" If this were correct, the electric fluid would seem to possess properties unknown to electricians, from Franklin to Faraday.

Against such a powerful and insidious foe as fire, it behoves us to take every possible precaution, seeing that even then we cannot *ensure* safety. This was strikingly exemplified in December last, at New York, in the destruction of the premises of Messrs. Harper, Brothers, printers, booksellers, and bookbinders, entailing a loss of over one million dollars. Having suffered by fire some ten years before, Messrs. Harpers had taken extraordinary precautions to prevent, if possible, the recurrence of such a calamity in their new premises. They had a steam boiler in the cellar; but with this exception, no fire was permitted in the building. The gas-lights were so arranged as to be perfectly safe. All the buildings were heated by steam-pipes, and the charcoal fires usually employed in binders' shops were replaced by gas-jets. Under these circumstances, a fire could hardly have happened, but for one of those unfortunate accidents which cannot be foreseen or guarded against. Camphine was used for cleaning the ink-rollers; but the operation was conducted in a room purposely prepared and lined with zinc. A plumber, making some repairs, had occasion to light an oil-lamp; which done, he threw the match, for safety, into what he thought a tray of water, but which was camphine. In an instant the place was in flames, which spread with such rapidity that the numerous persons employed at the time upon the premises escaped with great difficulty. The boasted excellence of the New York fire-engines, and the much-vaunted skill of their firemen proved of no avail, and the fire rage uncontrolled until these extensive premises, with their multifarious and valuable contents, were a heap of ruins.

Spontaneous ignition, it will be seen, has occasioned 29 fires, in the metropolis alone, during the past year. The most remarkable case of spontaneous ignition that has come under notice for some time occurred in the residence of Mr. Fletcher, at the Literary and Philosophical Society, in George-street, Manchester; who, on entering his room one

afternoon, found the sofa on fire. Having dragged it into the yard, and extinguished the fire that was burning in the interior, he found, upon examination, that the sofa had been stuffed with cop-bottoms and rovings, which, being greasy, had spontaneously ignited.

The number of last year's fires, at which the premises were "totally destroyed," was 20, and the number of buildings destroyed 27. Few of these, however, were fires of any magnitude; the heaviest and most serious fires, with two or three exceptions, being found in the list of "seriously damaged," at 32 of which the building and contents were "all but destroyed."

Among the serious fires, may be noticed the following:

Sunday, June 5th. The Gutta Percha Company's works in the Wharf-road, City-road, the heat from which was so great as to set fire to several buildings in the Wenlock-road, on the opposite side of the canal or basin, upwards of 100 feet wide.

Wednesday, June 22nd. Messrs. M'Neill and Co's patent felt works, Lamb's-passage, Bunhill-row, Finsbury.

Saturday, July 16th. Mr. Archer's timber stores, Lower North-street, Knightsbridge.

Tuesday, August 9th. Messrs. Kirkman's pianoforte manufactory, Dufour's-place, Broad-street, Golden-square.

Thursday, October 20th. Mr. Dudin's granary, Shad Thames.

Friday, October 28th. Mr. Leek's packing-case manufactory, Little Moorfields.

Saturday, December 3rd. Messrs. Price and Gosnell, brush-makers, Upper Thames-street.

The Steam floating fire-engine has been brought into operation at *four* of the last year's fires. The first occasion was on Monday evening, July 4th, when a fire broke out in the steam-ship *Trident*, which had arrived at St. Katharine's Wharf, from Leith, about an hour and a half before. The crew had made preparations to unload the vessel, when smoke was perceived issuing from the after-hold, and, on examination, flames were seen rapidly spreading among the goods in that part of the ship. An alarm was instantly raised, buckets were got to work until the engines could arrive, and every exertion used to arrest the progress of the flames. The Brigade-floating engine from Rotherhithe, that belonging to the St. Katharine's Dock Company, as well as the Steam-floating engine from Southwark-bridge, and nine land engines, were brought up as quickly as possible, and immense torrents of water were poured into the burning ship. Notwithstanding the powerful force thus arrayed against it, the fire raged with the utmost violence, and was only vanquished at last by *sinking the vessel*. This subject is suggestive of melancholy reflections. Here we have a fire breaking out in a large and roomy vessel, in still water, alongside a wharf; the fire discovered in its infancy, and an overwhelming force of engines, plied by a skilful and well-trained Brigade, and all without avail! What prospect could there be for such a vessel on fire in a rough sea, with but such an engine as is usually thought sufficient to give the required protection, and only the scanty crew and affrighted passengers to make the necessary exertions? We cease to wonder at the fate of the *Amazon*.

The Steam-floating engine was next called into operation at a fire which broke out at midnight of Friday, September 9th, in the extensive premises of Messrs. Scott, Russell and Co., engineers and iron-ship builders, Mill-wall, Poplar. The flames were first perceived in the boiler-makers' and forging shops, the roof of which was formed of weather boarding and tarpaulins, the inflammable character of which led to the rapid spread of the fire. The light-illumined sky at once caused a general turn out of firemen and engines, amid much confusion as to which side of the water the conflagration was situated. The Government-floating engine, moored off Deptford Dockyard, and nearly opposite the burning premises, was manned by the marines and got to work. The Floating engine from Rotherhithe and the Steam floating engine were taken down as quickly as possible. Ten land engines from the Brigade and West of England Stations were also in attendance, and the utmost exertions were made by all present to arrest the progress of the flames. The distance from town, and the highly inflammable character of the buildings and their contents, led to a very serious destruction of property before any efforts could be made for their preservation; and some idea of the violence of the fire may be inferred from the fact, that in little more than two hours, it has swept away many thousand pounds worth of property.

The boiler makers', forging, carpenters', and joiners' shops, with the saw-mills beneath, as well as the fitting and erecting shops, with their valuable stock of tools, machinery, and unwrought materials were entirely destroyed. With a view of preventing such a catastrophe, the firm some time ago caused a reservoir of water to be erected over the fitting shops, with pipes laid over the whole establishment, so as to afford a supply of water at any point where it might be required. "The lightning-like progress of the fire," it was said, "paralysed the men, who, in their dismay and excitement, *forgot the tank!*" ...

Thursday, October 20th, about seven o'clock in the evening, a fire broke out in the premises of Mr. Dudin, wharfinger and granary keeper, Shad Thames. The fire commenced in one of the upper floors of a granary, five stories high; and, before the firemen could reach the spot, progressed rapidly upward. The Rotherhithe and Steam-floating engines were brought to bear with as little delay as possible, and nine engines on the land side lent their aid. Before the fire could be mastered, however, the three upper floors and roof were entirely destroyed, and the two lower floors and contents severely damaged by fire and water.

Saturday, December 3rd, at midnight, the Steam-floating engine was again in request at a fire which broke out in a lofty pile of warehouses, eight stories high, in Upper Thames-street, occupied conjointly by Messrs. Price and Gosnell, brush makers; Messrs. J. and E. Saunders, paper-box makers; and Messrs. Selby and Co., metal tube manufacturers. The fire commenced in one of the upper floors, and such a dense fog prevailed at the time, that the fire could not be seen a few yards off. Although close at hand, much time elapsed before the steam-float could be got alongside. Meantime, the land engines of the Brigade and West of England were got to work and placed in the best positions. For a long time, however, the flames revelled in the upper floors quite uncontrolled, and it was not until the premises were burned down to the third floor, that any effectual check could be offered to their progress. The five upper floors and contents, as well as the roof, were entirely destroyed, and the three lower floors damaged by fire and water.

Upon each of these occasions the Steam-floating engine proved a valuable auxiliary to the land forces; at the same time it cannot be concealed that the time inevitably occupied in conveying it, even to short distances, greatly limits its usefulness. The impossibility of getting sufficiently close to the burning pile also renders it unfit to cope with fires in the upper floors of lofty buildings. On the other hand, "it never tires or stops to rest," and is capable of throwing up great quantities of water. Mr. Braidwood, in his report to the Committee of the *London Fire Establishment*, says, "The Steam-floating engine has done *all that was expected* from her during the past year."

Mr. Braidwood, in the same document, speaks in terms of the highest commendation of the good conduct of the firemen, and especially the four foremen, to whose excellent example the alacrity and hearty good-will of the men is mainly attributed.

The Directors of the *West of England* Fire-office have expressed a similar opinion of the conduct of their Fire Brigade; but considering that empty praise was wholly inadequate to convey a proper expression of their high appreciation of the services rendered, they put their thanks into the substantial and intelligible form of a *handsome donation* to their respected superintendent, Mr. Connorton, and his men.

13, Angell-terrace, Islington, Feb. 3, 1854.

ON VIBRATIONS AND TONES PRODUCED BY BODIES IN CONTACT.

Professor Tyndall lately addressed to the Royal Institution an important lecture on the above subject. The following is a summary of his remarks:

In the year 1805, M. Schwartz, an inspector of one of the smelting works of Saxony, placed a cup-shaped mass of hot silver upon a cold anvil, and was surprised to find that musical tones proceeded from the mass. In the autumn of the same year, Professor Gilbert, of Berlin, visited the smelting works and repeated the experiment. He observed that the sounds were accompanied by a quivering of the hot silver, and that when the vibrations ceased, the sound ceased also. Professor Gilbert merely stated the facts, and made no attempt to explain them.

In the year 1829, Mr. Arthur Trevelyan, being engaged in spreading pitch with a hot plastering iron, and once observing that the iron was too hot for his purpose, he laid it slantingly against a block of lead which chanced to be at hand; a shrill note, which he compared to that of the chanter of the small Northumberland pipes, proceeded from the mass, and, on nearer inspection, he observed that the heated iron was in a state of vibration. He was induced by Dr. Reid, of Edinburgh, to pursue the subject, and the results of his numerous experiments were subsequently printed in the Transactions of Royal Society of Edinburgh.

On the 1st of April, 1831, these singular sounds and vibrations formed the subject of a Friday Evening Lecture by Professor Faraday, at the Royal Institution. Professor Faraday expanded and further established the explanation of the sounds given by Mr. Trevelyan and Sir John Leslie. He referred them to the tapping of the hot mass against the cold one underneath it, the taps being in many cases sufficiently quick to produce a high musical note. The alternate expansion and contraction of the cold mass at the points where the hot rocker descends upon it, he regarded as the sustaining power of the vibrations. The supe-

riority of lead he ascribed to its great expansibility, combined with its feeble power of conduction, which latter prevented the heat from being quickly diffused through the mass.

Professor J. D. Forbes, of Edinburgh, was present at this lecture, and not feeling satisfied with the explanation, undertook the further examination of the subject; his results are described in a highly ingenious paper communicated to the Royal Society of Edinburgh in 1833. He rejects the explanation supported by Professor Faraday, and refers the vibrations to "a new species of mechanical agency in heat"—a repulsion exercised by the heat itself on passing from a good conductor to a bad one. This conclusion is based upon a number of general laws established by Professor Forbes. If these laws be correct, then, indeed, a great step has been taken towards a knowledge of the intimate nature of heat itself, and this consideration was the lecturer's principal stimulus in resuming the examination of the subject.

He had already made some experiments, ignorant that the subject had been further treated by Seebeck, until informed of the fact by Professor Magnus, of Berlin. On reading Seebeck's interesting paper, he found that many of the results which it was his intention to seek, had been already obtained. The portion of the subject which remained untouched was, however, of sufficient interest to induce him to prosecute his original intention.

The general laws of Professor Forbes were submitted in succession to an experimental examination. The first of these laws affirms that "*the vibrations never take place between substances of the same nature.*" This the lecturer found to be generally the case when the hot rocker rested upon a *block*, or on the edge of a thick plate of the same metal; but the case was quite altered when a thin plate of metal was used. Thus, a copper rocker, laid upon the edge of a penny-piece, did not vibrate permanently; but when the coin was beaten out by a hammer, so as to present a thin sharp edge, constant vibrations were obtained. A silver rocker, resting on the edge of a half-crown, refused to vibrate permanently; but on the edge of a sixpence continuous vibrations were obtained. An iron rocker on the edge of a dinner knife gave continuous vibrations. A flat brass rocker placed upon the points of two common brass pins, and having its handle suitably supported, gave distinct vibrations. In these experiments the plates and pins were fixed in a vice, and it was found that the thinner the plate, within its limits of rigidity, the more certain and striking was the effect. Vibrations were thus obtained with iron on iron, copper on copper, brass on brass, zinc on zinc, silver on silver, tin on tin. The list might be extended, but the cases cited are sufficient to show that the proposition above cited cannot be regarded as expressing a "general law."

The second general law enunciated by Professor Forbes is, that "*both substances must be metallic.*" This is the law which first attracted the lecturer's attention. During the progress of a kindred inquiry, he had discovered that certain non-metallic bodies are endowed with powers of conduction far higher than has hitherto been supposed, and the thought occurred to him that such bodies might, by suitable treatment, be made to supply the place of metals in the production of vibrations. This anticipation was realised. Rockers of silver, copper, and brass, placed upon the natural edge of a prism of rock-crystal, gave distinct tones; on the clean edge of a cube of fluor spar, the tones were still more musical; on a mass of rock-salt the vibrations were very forcible. There is scarcely a substance, metallic or non-metallic, on which vibrations can be obtained with greater ease and certainty than on rock-salt. In most cases a high temperature is necessary to the production of the tones, but in the case of rock-salt the temperature need not exceed that of the blood. A new and singular property is thus found to belong to this already remarkable substance. It is needless to enter into a full statement regarding the various minerals submitted to experiment. Upwards of twenty non-metallic substances had been examined by the lecturer, and distinct vibrations obtained with every one of them.

The number of exceptions here exhibited far exceeds that of the substances which are mentioned in the paper of Professor Forbes, and are, it was imagined, sufficient to show that the second general law is untenable.

The third general law states, that "The vibrations take place with an intensity proportional (within certain limits) to the difference of the conducting powers of the metals for heat, the metal having the least conducting power being necessarily the coldest." The evidence adduced against the first law appears to destroy this one also; for if the intensity of the vibrations be proportional to the difference of the conducting powers, then, where there is no such difference, there ought to be no vibrations. But it has been proved in half a dozen cases that vibrations occur between different pieces of the same metal. The condition stated by Professor Forbes, was, however, reversed. Silver stands at the

head of conductors; a strip of the metal was fixed in a vice, and hot rockers of brass, copper, and iron, were successively laid upon its edge; distinct vibrations were obtained with all of them. Vibrations were also obtained with a brass rocker which rested on the edge of a half-sovereign. These and other experiments show that it is not necessary that the worst conductor should be the cold metal, as affirmed in the third general law above quoted. Among the metals, antimony and bismuth were found perfectly inert by Professor Forbes; the lecturer, however, had obtained musical tones from both of these substances.

The superiority of lead as a cold block, Professor Faraday, as already stated, referred to its high expansibility, combined with its deficient conducting power. Against this notion, which he considers to be "an obvious oversight," Professor Forbes contends in an ingenious and apparently unanswerable manner. The vibrations, he urges, depend upon the difference of temperature existing between the rocker and the block; if the latter be a bad conductor and retain the heat at its surface, the tendency is to bring both the surfaces in contact to the same temperature, and thus to stop the vibration instead of exalting it. Further, the greater the quantity of heat transmitted from the rocker to the block during contact, the greater must be the expansion; and hence, if the vibrations be due to this cause, the effect must be a maximum when the block is the best conductor possible. But Professor Forbes, in this argument, seems to have used the term expansion in two different senses. The expansion which produces the vibration is the sudden upheaval of the point where the hot rocker comes in contact with the cold mass underneath; but the expansion due to good conduction would be an expansion of the general mass. Imagine the conductive power of the block to be infinite, that is to say, that the heat imparted by the rocker is instantly diffused equally throughout the block; then, though the general expansion might be very great, the local expansion at the point of contact would be wanting, and no vibrations would be possible. The inevitable consequence of good conduction is, to cause a sudden abstraction of the heat from the point of contact of the rocker with the substance underneath; and this the lecturer conceived to be the precise reason why Professor Forbes had failed to obtain vibrations when the cold metal was a good conductor. He made use of *blocks*, and the abstraction of heat from the place of contact by the circumjacent mass of metal, was so sudden as to extinguish the local elevation on which the vibrations depend. In the experiments described by the lecturer, this abstraction was to a great extent avoided by reducing the metallic masses to thin laminæ; and thus the very experiments adduced by Professor Forbes against the theory supported Professor Faraday appear, when duly considered, to be converted into strong corroborative proofs of the correctness of the views of the philosopher last mentioned.

PRINCIPLES AND CONSTRUCTION OF LOCKS.

Mr. A. C. Hobbs read a paper on the above subject before the Institution of Civil Engineers, on February 14, 1854.

The author commenced by asserting, as an axiom, that the highest point of security to be attained in the construction of locks, must consist in the fact that the possibility of picking or opening them, without their true keys, should depend entirely on chance; and that, notwithstanding the immense variety of locks already invented, there were really but three absolutely distinct principles involved in their construction,—so classed without reference to dates, and for convenience of description.

The first principle included all locks having a series of fixed obstructions, or wards, in and about the key-hole, to prevent any instrument, except the key, being turned in the lock; this principle was shown to be inefficient, however complicated the construction might be, as the wards themselves afforded the means of ascertaining the form of key required to open the lock.

The second principle was that of the letter, or puzzle lock, which appeared to carry out the principle or doctrine of chance, to the fullest possible extent. But in this case, also, a method was shown, by which the lock could be opened as easily as in the former; proving that the inventor of that class of lock had failed to accomplish the object of producing a fastening, whose security was dependent only on mere chance.

The third principle, or last class of locks, included all those possessing a series of moveable pieces called slides, pins, tumblers, &c., placed within the case of the lock, and which pieces must be operated upon and moved into certain given positions, by a key, before the bolt could be shot. This principle was illustrated by descriptions of the Egyptian lock, the Bramah lock, the inventions of Barron and of Bird, the Detector of Mitchell and Lawton, and the later improvements of Chubb and Cotterill (of Birmingham) and others.

Allusion was then made to the great reliance which, until recently, had been placed on these locks, and an explanation was given of the principle on which all locks of this description could be as easily picked as their predecessors.

The author then commented on the necessity of devising some simple and effective means by which the defect, common to all the above locks, might be remedied, without adding materially to the cost. This desideratum he had endeavoured to secure, by the introduction of what was called a moveable stump, which projection, instead of being riveted into the bolt, was fixed to a piece moving upon a centre, or pin, at the back of the bolt. The action of that piece was such as to render it impossible to ascertain the true position of the tumblers; for, on any pressure being applied to the lock for that purpose, the stump, by its motion, locked the bolt, and left the tumblers at perfect liberty. The author stated his conviction that this apparently slight alteration rendered it impossible to open such a lock, except by the mere chance or accident of a key fitting it; there being no possible means of ascertaining the form of key requisite to open it surreptitiously. Since the introduction of this lock, several attempts had been made to produce the same result, without actually copying the original; but with very little success.

An additional principle of security, devised in America, was then pointed out, in the celebrated permutating bank lock, invented by Robert Newell, of the firm of Day and Newell, New York, of which invention Mr. Hobbs was the proprietor in this country. Previous to the introduction of that system, permutating keys had been used; but they required that the lock itself should be altered to suit any new adjustment of the bits of the key, whereas in the American lock the key alone, being altered, produced by its own action the corresponding arrangement in the lock. By this ingenious contrivance the person using the lock became his own lock-maker, and was able to render the key useless to any other person, by a simple change in the bits, after locking the door. Such locks, whose numbers of permutations varied from 720 to 479,001,600, according to the number of bits in the key, were intended principally for strong-rooms of banks and other establishments, where large amounts of property were deposited. They were, therefore, comparatively expensive, and were necessarily of larger size than locks required for ordinary use.

In conclusion, it was remarked, that questions would continually arise as to the violability or inviolability of particular locks, and especially of new inventions. The author, however, claimed to have established that any new modification or arrangement of the parts of locks, which did not affect the principle of construction, could have no particular claim to security, or conversely, that if it could be shown that any lock was constructed on a principle not hitherto violated, it might be deemed secure; but certainly not, unless such a claim could be made good. In respect to the locks alluded to in the paper, the author justified his statements by the two facts,—that he had not only elucidated the principles on which all such locks might be picked, but that he had actually performed all that had been described. Finally, a hope was expressed, that whatever had been done and said to enlighten the public as to the insecurity of many locks now in use, instead of causing any unpleasant personal feelings, would stimulate lock-manufacturers to produce what was really required, viz., secure locks, adapted to all purposes, of good workmanship, and at a moderate price.

The discussion on Mr. Hobbs' paper will be resumed on Tuesday, February 21st.

Privy Council, February 16, 1854.

LEACH'S WOOL-CARDING PATENT.

(*Before the Right Hon. Pemberton Leigh, the Right Hon. the Judge of the Admiralty Court, the Right Hon. Sir Edward Ryan, and the Right Hon. Sir John Patteson.*)

This was a petition for the prolongation of a patent granted to Edmund Leach, of Rochdale, for "Certain improvements in machinery or apparatus for carding, doubling, and preparing wool, cotton, silk, flax, and other fibrous substances," bearing date May 28, 1840. Trade being at that time in a bad state, the patent was not productive of profit; and when one of the machines was put to work in 1842 by a Mr. Butterworth, he received notice that it was an infringement of a patent previously granted to Mr. J. G. Bodmer, who then brought an action against Leach for the infringement, but was nonsuited. The litigation was not terminated until 1846, when the times were again very bad, and the invention unremunerative. In the years 1851, 1852, and 1853, however, the use of the patent had increased, and the patentee had realised some profit. Mr. Webster appeared for the petitioner, and was about to call witnesses, when their Lordships said, that from the opening of the learned Counsel's address they thought the petition ought to be

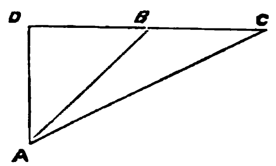
dismissed, a sufficient case not being made out to warrant their recommending an extension of the patent.

LIPSCOMBE'S IMPROVEMENTS IN SHIPBUILDING.

To the Editor of the Mechanics' Magazine.

SIR,—Suffer me, in reply to Mr. Lipscombe, to assert again, that the true law of the diminution of resistance on oblique surfaces is not that which he claims "the honour of first discovering and publishing." I endeavoured to make this plain in my former letter; but instead of convicting me of inaccuracy, he contents himself with reiterating the assertions controverted. Had he adopted the other, and only proper method of conducting a discussion on a scientific question, he could not have failed to see, that in endeavouring to give a popular explanation of the law of resistances, I made a very stupid blunder. Instead of correcting myself there, allow me to calculate the resistance in one of Mr. Lipscombe's cases as nearly as the present state of hydrodynamical science will allow. He says, that the resistance on (fig. 6) page 125, is only half that on (fig. 7.)

Let BDA and CDA be the front parts of the figs. 6 and 7, so that DB=BC=DA.



Then, if R and S are the resistances on AC and AB respectively,

$$\frac{R}{S}=\frac{AC \times \sin^3 C \times (\text{vel})^2}{AB \times \sin^3 B \times (\text{vel})^2}$$

$$=\frac{AD^3}{AD^3} \times \frac{AB^2}{AC^2}=\frac{2}{5}$$

∴ R : S : : 2 : 5 and not as 2 to 4 : this error runs through all his calculations. He says further, that "If we double the beam of an ordinary ship, we increase the resistance of the water to its onward motion fourfold." It will be seen, that the form of an ordinary ship partakes of what he calls the principle of the inclined plane as well as that of the wedge, and that the increase of which he speaks is the greatest when this latter form appears alone. Suppose therefore that BAD represents a horizontal section of half the bow of such a ship moving in the direction DA; and CAD, that of another in which the beam is doubled; then, as before,

$$\frac{R}{S}=\frac{AC \times \sin^3 CAD \times (\text{vel})^2}{AB \times \sin^3 BAD \times (\text{vel})^2}$$

$$=\frac{CD^3}{BD^3}\cdot\frac{BA^2}{CA^2}=8\times\frac{2}{5}=\frac{16}{5}, \text{ and not}$$

$\frac{20}{5}$, as he would have us believe.

After thus justifying my assertion, that his calculations are inaccurate, I should like to look again at the principle of the invention, which I stated to be "to increase the length and breath and diminish the depth of ships." Not that Mr. Lipscombe says so, but that he seems to mean it: he cannot surely imagine that this use of the inclined plane is his invention, for the bows of barges are invariably made in this way; nor can he suppose that the increased length of the plane is the new characteristic, for this was patented by Mr. D. S. Brown as a means of getting to America in forty-eight hours, and has been noticed in your pages.

The principle involved may be made clear, I think, by the following illustration. Let the wedge (fig. 3, p. 125,) be supposed to have a depth equal to half its greatest breadth, and to be cut down the middle in a vertical longitudinal plane; then, if the two triangular surfaces are placed in cont ct, we shall form (fig. 8), with an *uni/ rm, breadth*, equal to the *greatest breadth of* (fig. 3). The resistance on these two bodies will be the same, but the former will have much the greater stability, and may be afely lengthened, so as to diminish the resistance. Retaining the same displacement, and lengthening the vessel to the extent which Mr. Lipscombe recommends, we shall ultimately arrive at the form of a raft, which appears to be the perfection of his system. We have undoubtedly expressed in this a most important principle, on which, in fact, boats for landing troops and barges are built. They are exceedingly shallow, and therefore well fitted for river navigation; very stable, and tolerably fast.

These are very important advantages; and ship-builders know them to be so; but they know also that if sailing ships were constructed in this way, they would be as completely unmanageable as a balloon, and would be, in fact, under the same conditions. This peculiar form is only admissible in barges, because it is possible to get hold on the water by the use of lee-boards; but they are quite out of the question in ocean navigation; and the whole art of seamanship depends on the possession of that very depth which excites the ridicule of Mr. Lipscombe. I cannot help believing that the naked savage, with his sail of plaited reeds, would teach our inventor something

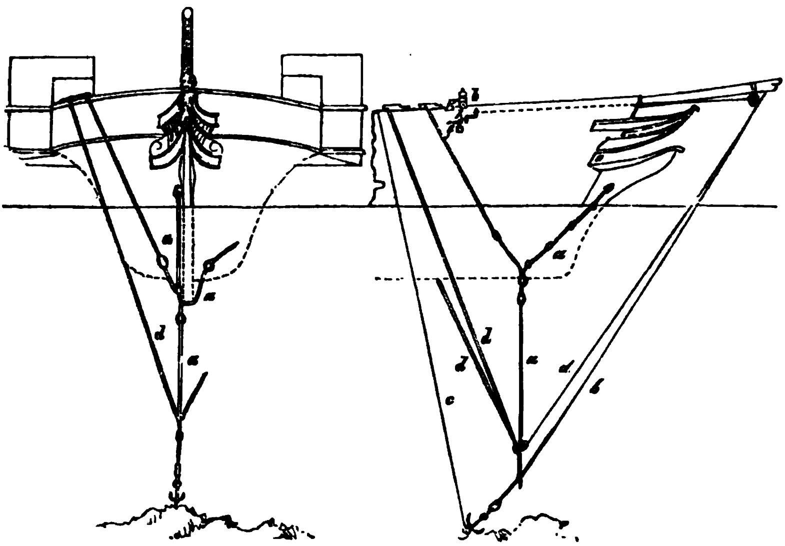
of the art of ship-building; and that the ancient Briton, in his shallow coracle, would have disputed his patent right. Yet, while waiting patiently for the result of Mr. Lipscombe's experiment, we may, I think, safely predict, that unless he has a keel of so great a depth as to get the same amount of lateral resistance as ordinary ships, his vessel, as a sailing ship, will be an utter failure. If, however, he should alter his determination, and propel her by steam power, he will probably produce a very fast vessel. N. B.

Sheerness, Feb., 1854.

SHOAL-WATER INDICATOR.

Mr. Edwards, a mechanical officer of Her Majesty's Dockyard, Pembroke, has communicated to us the description of an invention, the object of which is to indicate when a vessel under steam or canvas comes into water of any given depth. The apparatus is to be employed chiefly in fogs and at night-time, and is intended to afford a more certain and ready means of ascertaining when the vessel employing it is nearing a coast or shoal than is provided by the ordinary soundings.

The accompanying engravings represent a bow and partial side view of a steam-



vessel fitted according to Mr. Edwards's invention. *a* is a copper or iron rod of about three-fourths of an inch in diameter, and of any desirable length, say three fathoms. This rod is attached by an eye, or other contrivance, to the under side of the keel, and is kept in a vertical position by the stays, *d d*. *b* is a line to which a grapnel and weight are attached, and which is secured on board the vessel to a lever, *f*, that has connected to it a weight sufficiently large to counteract the tension produced upon the line by the resistance of the water against it. *c* is a line, by means of which soundings may, if deemed necessary, be taken, the ordinary lead line being in that case dispensed with. When the rod or grapnel takes the ground, the line, *b*, slipping from the lever, *f*, will cause the reel, *g*, to revolve, and the hammer, *h*, to strike the bell, thereby indicating that the vessel is in shoal water.

It is evident that the grapnel and weight can be lowered to any depth that may be considered necessary, according to the circumstances of the vessel, and the apparatus is of course to be fitted so as to admit of being readily unshipped when not in use.

"W. T.'S" NEW THEORY OF ELECTRICITY.

To the Editor of the Mechanics' Magazine.

Sir,—Will you kindly allow me to make a few suggestions and remarks respecting the new theory of electricity proposed by "W. T." of Islington, which lately appeared

in your interesting and instructive Magazine.

"W. T." gives an hypothesis that "Electricity is the effect of the revolution of atoms of matter upon their axes;" and that atomic motion is electricity, whether existing naturally or induced by artificial means. From "W. T.'s" explanation of this hypothesis, it appears to me that the atomic motion proposed must be either one of atoms of matter in an intensified state of revolution upon *fixed* axes, each consecutive atom imparting a similar motion to the most adjacent; or, that in addition to such a state of revolution, each atom has also a longitudinal motion in the line of the electric circuit. Both of these suppositions, however, appear, in some remarkable instances, to be directly opposed to what we already know of electricity and its development. If the former be the state of atomic motion which constitutes electricity, how are we to account for its passage through a vacuum, in which every one knows no matter exists; as for example, in an experiment, showing the identity of frictional and voltaic electricity lately exhibited by Professor Faraday at the Royal Institution, a notice of which appeared in the *Mech. Mag.* of the 28th of January.

In this experiment we find *a space in the vacuum of seven inches intervening between the terminals of the battery.*

Now, may we not infer from this, that such a state of atomic motion cannot be electricity, because all such motion would cease when there were no longer any particles of matter to be acted upon? A question also arises whether these atoms could communicate their motion to those adjacent, as "W. T." supposes? and whether a greater number of atoms could be in motion than have it communicated to them by artificial means? For, after giving motion to a certain quantity of matter by friction or chemical action, we should not find any increase either in the quantity or intensity of electricity by such matter coming in contact with any other; as, for instance, the atoms which constitute the substance of conductors; otherwise, by increasing their surface and length, we should obtain an increase of electricity bearing some proportion to such increased capacity. On the contrary, we find that after increasing their size to an extent admitting of perfect conduction, we do not obtain any further increase in effect by a further enlargement of them. Again, with respect to non-conducting substances, the case would appear to be the same; for were we to construct two electrical machines, one having a surface of glass any number of times greater than the other, but having in both an equal surface acted on by the rubber, and also having in the larger machine increased facility for collecting the electricity in proportion to the increase of size, still should we not obtain just the same amount of electricity in both cases? And if so, does it not prove that the atoms of matter acted on by friction would not extend their motion to the contiguous atoms of the glass? Again, in the experiment before alluded to, the very existence of matter (air) in the receiver effectually opposes the current until such matter is withdrawn, when the electricity immediately passes, completing the circuit; and no motion can be given to atoms of matter where they do not exist. I should therefore be glad to be informed how, in electrical action, atomic motion is communicated to contiguous atoms. Supposing, however, that electricity is simply the intensified motion of that quantity of matter only that has had such motion first imparted to it by artificial means, and that such matter has also a progressive motion in the line of the electric circuit, each individual atom travelling throughout it; and presuming that these atoms are those of the constituent elements of the substances between which the action takes place; remembering also, that no current of electricity can be caused unless some portion of matter is left in a negative state; let us take, for example, a simple voltaic arrangement of zinc, fluid, and copper, in which electrical action takes place between the zinc and fluid, which latter, conducting the electricity to the copper, leaves the zinc in the negative state. Atoms, therefore, of zinc, fluid, or both, would be transferred to the copper, and thence returned to the zinc end of the arrangement. Now how can the zinc-plate be left in a negative state by the transference of some of its particles to the copper? For were atoms of zinc in motion, the copper-plate must remain negative until the greater portion of the zinc was transferred to it; and this would be impossible, as these particles would be constantly returning to the zinc. Many other instances might be brought to show that the particles of the matter acted on, however minute, cannot travel on the surface of conductors in the manner proposed, because the matter in motion, coming from the same kind of matter, must necessarily leave it in a negative condition; that is to say, minus its own substance, which is impossible. This kind of atomic motion, therefore, cannot be electricity.

As I may, however, have altogether mistaken "W. T.'s" theory, and wish for further information on the subject, I should be greatly obliged for a fuller explanation of it.

I am, Sir, yours, &c.,

R. H. S.

Camden-town.

FIRE-ESCAPE.

To the Editor of the Mechanics' Magazine.

SIR,—If you think the enclosed suggestions are new, and likely to be of benefit to the public, you will oblige an old subscriber by their insertion in your very useful Magazine.

I would observe, that many years ago I repeatedly mentioned these suggestions in private circles, and I am impelled to make them public, in consequence of the late fatal fire in Soho. 1. I propose providing a basket made of wire, with cushions, capable of holding two or more persons, to which basket a flat wire-rope is to be attached, which shall be of a length equal to twice the height of the highest ordinary building. To this wire-rope is to be connected a thin and light cord, about twice the length of the wire-rope; and to the basket must also be attached two or three cords, or very light wire-ropes, of a length equal to the height of the houses. 2. At the top or nearly so of every house, let there be a bracket, with a friction-pulley placed out at a distance of two or three feet from the house. 3. In each district, containing say 100 houses, some place, as a police-office or a branch fire-office, shall be appointed to receive the basket and its appendages; also a pistol, with some rockets, attached to the long light cord. The fireman or policeman shall fire this rocket over the pulley at the top of the house, so as the rocket may fall on the opposite side of the pulley, and thus secure an almost instantaneous communication with the inmates of any house needing help. The two or three small wire cords are for the help of any one ascending in the basket to reach any part of the house; and if fire is bursting out at the bottom part of the house, the basket may be pulled with these small cords by the persons below, far from the reach of danger; and when brought to the level of the window needing help, the cords can be slackened, so as the basket can receive the parties waiting to enter it. If it be objected that firing a pistol would be unpleasant to the neighbours, I think, on the contrary, it would be an advantage in awaking the neighbours, especially those more immediately concerned. Thus, I think, a very cheap and safe way of escape might be provided even for the poorest localities.

Where expense is not so much the question, I would propose that each house be provided with the bracket, as before described, but with the addition of a light cord, of a length equal to double the height of the house, so fixed to the pulley, that upon a slight touch being applied to it, the cord would fall in equal lengths on both sides of the pulley to the ground; thus giving immediate communication to parties outside the house. The cord might then be attached to the basket, or a belt might be fastened round the body of a fireman, and he pulled up and thus assist the inmates. The means I propose to loosen the cord, so as to cause it to fall, are various; but perhaps the most simple is that of having a bell-wire with a ring, coming, say within 15 or 18 feet from the ground. This might be pulled by a man having a long slight pole with a hook, causing the rope to be detached from the roller, and to fall half on either side.

If it be said that this would give the burglar a facility in committing robbery, I would suggest that this might be provided against by attaching the suspended wire to an alarm bell (such as I have made for years, and called "A Thief Detector,") fixed near, or in the bed-room; so that any one pulling the wire outside the house, would cause the bell to ring for two or three minutes, thus wakening up the inmates in case of fire or robbery.

JAMES CHESTERMAN.

Sheffield.

MATHEMATICAL PERIODICALS.

To the Editor of the Mechanics' Magazine.

SIR,—When Dickens published his "Nicholas Nickleby" more than one worthy Yorkshire schoolmaster put forth his claims to be considered as the *original* Mr. Squeers—the characteristics were *so like*. The same circumstances, it appears, are once more about to recur in the case of your correspondent, Mr. Tebay, for he not only urges his claims, but demands my authorities for the statements I made in No. 1586 of this Journal. My proofs are simply as follows:

1. Personal information that such has been the practice from the "Lancashire gentleman" himself.

2. The testimony of *one* to whom the "friend at Cambridge" acknowledged the fact.

3. The testimony of *another* who has himself supplied the "Lancashire gentleman" with solutions for similar purposes.

All this evidence can be produced, *on oath if necessary*, and I am not aware that anything further need be required to justify my condemnation of the practice. Strutting in borrowed plumes is by no means a thing of to-day, but has been going on in our periodicals for years. *Pecuniary considerations* weigh powerfully with those "whose *special* education is far in advance of their *general*;" and I am in possession of undeniable evidence, that as much as £2 have been paid for a single solution. Nearly all the rest of Mr. Tebay's remarks

are utterly beneath contempt. He admits quite as much as can be expected under the circumstances. We all know, or can easily *suppose*, how solutions are *moulded* when the materials are supplied; and I can well afford to pass by in silence the whole of those polite indications of anger which he no doubt considers to be so very pertinent to his purpose. There is one portion, however, to which I must give an emphatic contradiction. No mutual friend can possibly have informed him that we had put "our solutions together; that is, made mutual exchanges, in order that both might make a greater score than either could separately." These assertions contain what I believe to be a deliberate falsehood, apparently invented for the occasion; for neither friend nor foe can ever have made any such statement, *in truth*, since such a practice, so far as regards myself, most certainly has never existed. Were this a fact, it would have been something more than simply ridiculous for me to have pointed out the system of deception for public reprobation. It is not usual for guilty parties to condemn their own proceedings. In conclusion, I may add, that I have herewith enclosed the addresses of my informants, who are ready to confirm all that I have advanced; and notwithstanding the desperate denials and the abuse I may receive from self-convicted parties, I shall continue to expose the system as occasion offers, and shall remain content to abide by the result of any inquiries which may be instituted into the subject.

I am, Sir, yours, &c.,
T. T. WILKINSON.

Burnley, Feb. 18, 1854.

SOLDERING CAST IRON.

To the Editor of the Mechanics' Magazine.

SIR,—Perhaps the following information may be useful to some of your readers. Some time since I had occasion to solder some cast iron, but from some cause then unknown to me, I could not get the solder to adhere to the surface of the metal. I therefore applied to a tinman, who, after using spirit of salt, salammoniac, &c., succeeded but imperfectly. I then applied to a chemist to know the cause of our failure, and the man of science said it must arise from the presence of oxygen. He then advised me to expose the surface of the metal to the action of burning hydrogen; I did so, and its surface became covered with water; then, on applying the solder, I found the two metals would unite with facility. Yours,

A JOURNEYMAN BLACKSMITH.

Manchester, Feb. 18, 1854.

BELL'S REAPING-MACHINE.

IN quoting from the Journal of Agriculture, we had no intention of imputing dishonesty or bad faith to Mr. Croskill, and are not aware of having done so; we merely wished to confirm our previously-expressed opinion that the Reaper exhibited at the Smithfield Club Cattle Show, as Bell's Original Reaper, was not, in fact, a reaping-machine as invented by the Rev. Patrick Bell.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

MARTEN, JOHN, of High-street, Marylebone, Middlesex. *An improved shade for gas-burners and lamps.* Patent dated August 6, 1853. (No. 1839.)

This invention consists in constructing shades in two parts, or of two separate pieces of materials, the upper part being formed of ground glass, opal, or other semi-transparent substance, and the lower portion of glass, which should be perfectly transparent. The lower portion of the shade is employed for supporting the upper part of it.

MARTIN, RICHARD BARTHOLOMEW, of Suffolk-street, Haymarket, London. *An improved plate-warmer.* Patent dated August 6, 1853. (No. 1841.)

This invention consists in constructing plate-warmers with spaces between the sides and shelves, to be filled with hot water, and a mode of imparting additional heat to the water.

MORRISON, ROBERT, of Newcastle-upon-Tyne, engineer. *Improvements in apparatus for forging, shaping, and crushing iron and other materials, and for driving piles.* Patent dated August 6, 1853. (No. 1843.)

These improvements are mainly carried into effect by substituting for the hammer-block, piston, and piston-rod of large hammers a cylindrical bar of wrought-iron or other metal, to form the working hammer. On this bar the working piston, together with the guiding surfaces for the perpendicular movements, are either forged or cast solid, the bar itself being truly turned throughout its length. The steam cylinder is bolted to a pair of plate standards, stiffened at the back by strong ribs, and the piston bar works through upper and lower stuffing boxes in the cylinder, whilst it is guided by a T-head at its upper projecting end.

CHRISTY, RICHARD, of Fairfield, Lancaster, manufacturer, and JOHN KNOWLES, of the same place, manager. *Improvements*

in the manufacture of terry-cloth, or other woven fabrics having looped surfaces, and in the machinery or apparatus connected therewith. Patent dated August 8, 1853. (No. 1846.)

These improvements consist in the application and use of a simple clamping or holding apparatus, attached to and suitably actuated by the loom, or any convenient part of it, for the purpose of drawing up the terry warp threads to form the loops or terry, as the ordinary weaving processes proceed, and holding or retaining such loops or terry firmly whilst the necessary binding threads are introduced, and the loops or terry secured.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improvements in horse-shoes.* (A communication.) Patent dated August 8, 1853. (No. 1847.)

Claim.—Making the horse-shoe of two plates, and interposing India-rubber or other elastic substance between them.

HICKSON, WILLIAM, of Carlisle, Cumberland, gentleman. *Improvements in the application of heat for baking and drying purposes, and in the generation of steam.* Patent dated August 8, 1853. (No. 1848.)

This invention consists in the employment of one or more boilers, having one or more furnaces, each furnace being fitted with two sets of fire or grate bars, the upper of which are somewhat shorter than the length of the furnace, whilst the lower ones extend the whole length of the furnace, or up to the bridge. Between these two sets of fire-bars is fitted a series of angular or other suitably shaped water spaces, forming a kind of net-work with rectangular openings, through which the cinders or partially consumed fuel pass to the lower, as they fall from the upper series of bars. A communication is formed between the bottom and top furnaces by a series of lateral passages, which admit the hot air from the lower into the upper furnace, and thereby facilitate the combustion of the smoke and unconsumed gases given out by the unconsumed fuel.

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in regulating the flow and pressure of gas and other fluids.* (A communication.) Patent dated August 8, 1853. (No. 1849.)

Claim.—Combining two or more governors or regulators so that they may come into action in succession.

HALL, THOMAS YOUNG, of Newcastle-upon-Tyne, coal-owner. *Improvements in combining glass with other materials.* Patent dated August 9, 1853. (No. 1850.)

This invention relates to a mode of increasing the durability of glass, without interfering to any great extent with its transparency, and consists in the combination with glass, either on the surface or internally, of transparent, or partially transparent metal, such as wire-gauze, perforated copper, platina, talc, &c. This may be effected by fusing such metals or other materials with the glass, or by imbedding the other materials in the glass when in a plastic state, or in any other convenient method.

HALL, THOMAS YOUNG, of Newcastle-upon-Tyne, coal-owner. *Improvements in safety-lamps, part or parts of such improvements being applicable to the consumption or prevention of smoke, and for the purposes of ventilation generally.* Patent dated August 9, 1853. (No. 1851.)

In one of the inventor's arrangements, which sufficiently illustrates his invention, the chamber of the lamp is composed of disc glass for about three-fourths of its circumference, the other portion being composed of double wire-gauze, to the inside of which is attached a parabolic reflector, in conjunction with a plano-convex lens, either polygonal or not. The glass portion of the chamber is protected from injury by wire-gauze or talc, or the glass may be combined with metal, according to another invention, for which Mr. Hall has applied for letters patent.

ROWAN, WILLIAM, of the firm of John Rowan and Sons, of Belfast, Antrim, engineers. *Improvements in looms for weaving, and apparatus connected therewith.* Patent dated August 9, 1853. (No. 1852.)

Claims.—1. A method of equalizing the strain or tension on the cloth and yarn by making the changes in diameter of the cloth-beam or yarn-beam the means of varying the effective radius with which the tension-weights act. 2. Certain taking up and giving-off motions produced by a particular arrangement of weighted levers kept in the proper position for obtaining the best effect by endless screws put in motion by some portion of the machinery. 3. The employment of nippers as substitutes for the present temples in keeping the cloth distended, such nippers being in pairs, and acting alternately. 4. A mode of applying the dressing to the warp in the loom itself while the process of weaving is proceeding, instead of using an independent machine for the purpose, the dressing being applied by brushes having either a rotary or reciprocating motion.

BAINES, WILLIAM, of Coverdale-terrace, near Birmingham. *Improvements in railways.* Patent dated August 9, 1853. (No. 1855.)

This invention has for its object a better construction of the permanent ways of railways. The rails are made with ribs or pro-

jections on their sides, and at right angles, or nearly so, to the sides, to receive the fish-joints, by which the latter will be made to offer a better support. At the crossings, the rails which come together at an angle, or form the point, are made similar in form at their under to their upper surfaces, so that when worn on the latter they may be turned over, in order to fix the rails more securely in chairs than heretofore, and to allow of the rails being thus turned over. Each chair is made with a hollow jaw on one side to receive a filling-piece, which will, when a rail is turned over, compensate for the deficient part of the rail which is worn away; the other jaw is also made hollow and inclined, to receive a thickness of wood or flexible material, between which and the rail adjusting metal wedges are used, which in one form are drawn towards each other, and in the other are made to rotate in the face of each other; the faces being made with steps and inclined, the more they are moved, the more strongly they are caused to hold. The chairs are fixed to the sleepers by clipping-blocks of wood, which, together with the chairs, are fixed by treenails passing into the sleepers.

PARSONS, GEORGE, of West Lambrook, Somerset, engineer. *Improvements in steam engines and boilers.* Patent dated August 10, 1853. (No. 1857.)

This invention consists of improvements —1. In the slides of steam engines and apparatus for working them. 2. In constructing the flues of steam boilers; and, 3. In steam boilers, by constructing them with cases to receive the cylinders of the engines, so as to keep the cylinders from radiating heat by means of the exhaust steam.

BURDEN, JAMES, of Stirling, Scotland, brewer. *An improved cock or tap.* Patent dated August 10, 1853. (No. 1858.)

This invention consists in adapting and applying to cocks or taps for passing gases or fluids at a low temperature a packing similar to that used for high pressure purposes.

GALIBERT, JEAN PIERRE ALBERT, of Paris, France, doctor of medicine. *An improved domestic telegraph.* Patent dated August 10, 1853. (No. 1860.)

The inventor places a dial-plate in front of his apparatus, and has marked upon this plate a certain number of letters, figures, or other signs, corresponding with the several apartments of the building. When the instrument is at rest, each of these are concealed by means of a small sliding-plate or shutter, which is connected by a pin to a sliding-rod furnished with a retaining-spring, and to the upper end of the sliding-rod is attached a wire or cord communicating with one of the apartments of the building. The lower end of the sliding-rod passes through a bar which is connected by means of any ordinary self-adjusting escape-movement to the hammer of a bell, in such manner that the raising of any one of the rods will cause the hammer to strike the bell. The rising of the rod, caused by pulling the wire in any of the apartments, at the same time exposes to view its respective figure, letter, or sign, so as to indicate to the servants from which apartment the call is made.

MAC SWENEY, THOMAS, of America-square, London. *Improvements in the construction of ships and vessels.* Patent dated August 10, 1853. (No. 1862.)

The inventor constructs a vessel in several lengths, so that one end of one part shall be large enough just to overlap that end of the next part, which is to be connected immediately with it; and through the overlapping parts he inserts stout horizontal bolts or axes to hold the lengths together, and to constitute centres on which they may move; his object being to avoid the injury which results from the hogging of long, rigid ships.

HALL, SAMUEL, of Chadwell-street, Pentonville, Middlesex. *Improvements in furnaces.* Patent dated August 10, 1853. (No. 1863.)

This invention consists—1. In causing the front ends of the moveable fire-bars of Mr. Hall's patent furnaces to be prevented from rising by means of a fixed plate or bar, and in forming the bottom of the hopper moveable on a hinge or axis in such manner that, on lifting the bottom, it shall force the fuel to move towards the fire. 2. In regulating the supply of air underneath the fire-bars by means of a moveable plate acting as a valve above the inclined air-regulating plate employed in the above-mentioned furnaces. 3. In causing the clinker-plate to slide, and not to revolve on its axis.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *An improved preparation or composition to be applied to pigments for the purpose of facilitating the drying of the same.* (A communication.) Patent dated August 10, 1853. (No. 1864.)

The improved preparation which the patentee proposes to employ as a drier, and which is stated to be particularly applicable to zinc white paint, "is composed of sulphate of manganese, acetate of manganese, calcined sulphate of zinc mixed in about equal proportions and added to the mass of white oxide of zinc."

MUSHET, DAVID, of Coleford, Gloucester, gentleman, and EDWIN WHELE, of Shiffnal, Salop, engineer. *Improvements in pro-*

pelling steam vessels or other vessels. Patent dated August 10, 1853. (No. 1865.)

In this invention bars carrying series of vertical paddles, fixed to or moveable upon them, are attached to cranks which are driven by the main shaft.

FINNEMORE, JOSEPH BACON, of Easy-row, Birmingham, Warwick, manufacturer and EDWIN DANIEL CHATTAWAY, of Camden-street, Birmingham aforesaid, architect. *Improvements in apparatus for ascertaining or registering the number of persons travelling by omnibuses or other vehicles, or who may have entered in or passed by, out of, or through any particular place, vehicles, or building during any given period.* Patent dated August 11, 1853. (No. 1867.)

This invention consists in fixing to the doors of vehicles or buildings an apparatus consisting of an upright standard or pillar with cross-arms or levers, which are caused to rise and fall by means of an inclined plane, and which are so arranged that one arm must necessarily always stand across the entrance, whilst the other arms hang parallel to the upright standard.

DEWSNUP, THOMAS, of Manchester, Lancaster, stay and corset manufacturer. *Improvements in obtaining motive power.* Patent dated August 11, 1853. (No. 1868.)

This invention consists in substituting caoutchouc, or any composition of the same, instead of springs of every description now used for obtaining power, as in timepieces and other similar instruments.

HALL, THOMAS KELLY, of Crewe, Chester, smith. *Certain improvements in forge-hammers.* Patent dated August 11, 1853. (No. 1869.)

Claim.—"The raising or elevating of forge-hammers, by means of friction rollers in combination with an adjusting arm, by which the fall of the hammer is regulated and its speed or action governed."

BRAND, RICHARD FARMER, of South-terrace, Willow-walk, Bermondsey, Surrey, gun-maker. *Certain improvements in fire-arms and ordnance.* Patent dated August 11, 1853. (No. 1870.)

In the inventor's arrangement the interior of the breech is furnished with a small point or cutter projecting internally, immediately behind the touch-hole, which point or cutter, as the cartridge is pressed forward, cuts open the side of the cartridge, thus forming a communication from the powder in it to the touch-hole.

NAYLOR, HENRY MOORE, of Montpelier-row, Bloomsbury, Birmingham, Warwick. *Improvements in affixing postage and other stamps.* Patent dated August 11, 1853. (No. 1872.)

The inventor constructs an apparatus consisting of a chamber to receive a pile of postage or other stamps with the adhesive surfaces upwards, so that the upper one is at all times in a position to be taken on to a letter or document, when the same has been moistened by another part of the apparatus, which consists of a roller with a spongy or porous surface, to which water is supplied by another roller revolving in water, or having running on it an endless cloth moved through water; or the surface to be moistened may be lifted up by a lever or instrument.

DUNNICLIFF, JOHN DEARMAN, of Hyson-green, Nottingham, lace manufacturer, and JOHN WOODHOUSE BAGLEY, of Radford, Nottingham, lace manufacturer. *Improvements in the manufacture of lace fabrics.* Patent dated August 11, 1853. (No. 1873.)

This invention consists in making narrow lace fabrics in twist lace machines, and in applying them to the making of Honiton lace or Honiton sprigs.

DEARDS, GEORGE, of Harlow, Essex. *Improvements in lamps.* Patent dated August 11, 1853. (No. 1874.)

This invention relates to the application of spirit vapour lamps to railway-trains, and to those purposes generally where lamps are required to be moved through the air quickly; and the improvements consist of causing the wick of such a lamp to be enclosed in a tube which is perforated at its lower end, and which descends into the vessel containing the spirit. In order to prevent the strong currents of air coming against the upper part of the tube where the vapour is generated, and near where the vapour is ignited, the tube passes through a closed chamber, the lower part of which covers the opening into the vessel containing the spirit.

NEWELL, THOMAS FREDERICK, of Cloak-lane, Queen-street, Cheapside. *Improvements in machinery for numbering the pages of books and documents.* Patent dated August 11, 1853. (No. 1875.)

This invention has for its object the so arranging machinery for printing the numbers of pages of books and documents, that two pages may be simultaneously printed. For this purpose the two printing surfaces, consisting of the alternate numbers, are placed on either side of a revolving plate, and are inked by two inking apparatuses.

LONGMAID, WILLIAM, of Beaumont-square, Mile-end, Middlesex. *Improvements in the manufacture of manure.* Patent dated August 11, 1853. (No. 1876.)

This invention relates to the decomposition of certain organic substances, such as sea-weed and peat by means of potash, soda, and lime, and to the reduction of such compounds, or some or one of them,

to a powder, fit to be used as a manure, by means of a drill.

ADAMS, SAMUEL, of West Bromwich, Stafford, manufacturer. *A new or improved apparatus for regulating the supply of water to steam and other boilers; applicable also to regulating the supply of liquids to vessels and reservoirs in general.* Patent dated August 12, 1853. (No. 1878.)

Claim.—"The construction of an apparatus for regulating the supply of water to steam and other boilers, and of liquids to vessels and reservoirs generally, by causing the stream of liquid to pass through a pipe furnished with a stop-cock, which said stop-cock is so connected with a float in the boiler or vessel, that when the liquid in the said boiler or vessel is sufficiently high, the said stop-cock is opened, and the liquid permitted to escape, instead of being forced into the boiler or other vessel."

CANEGHEM, LOUIS VAN, of Conduit-street, Regent-street, Middlesex, steel busk manufacturer. *Improvements in fastening corsets by a mechanical busk.* Patent dated August 12, 1853. (No. 1879.)

This invention consists of a mechanical busk composed of steel or other suitable substance. To an ordinary busk the inventor rivets perpendicularly three or more pins, and employs a piece of steel, into which are cut perpendicularly three or more corresponding grooves, and the parts are then brought together and fastened.

STRONG, JAMES, of Smethwick, Stafford, engineer. *Improvements in furnaces for smelting ironstones and ores.* Patent dated Aug. 12, 1853. (No. 1880.)

The essential feature of this invention is, that the upper part of the furnace is large in proportion to the height, and the funnel-head is open and unimpeded, in order that the gases and products may pass freely away when they have arrived above the filling places round the funnel-head.

TURNER, THOMAS, and JOHN FIELD SWINBURN, both of Birmingham, Warwick, gun-manufacturers. *Improvements in sights for rifles.* Patent dated August 12, 1853. (No. 1881.)

Claim.—The combination of a solid block or foot with a leaf formed with a spring, which is made to press vertically upon the upper surface of the said block or foot.

HOLLIDAY, READ, of Huddersfield, York. *Improvements in lamps, and in lanterns used therewith.* Patent dated August 12, 1853. (No. 1883.)

These improvements apply to Mr. Holliday's patent hydro-carbon lamps, and consist chiefly in certain novel arrangements and combinations of the parts, adapting them for use in lanterns and other situations where they will be subjected to considerable motion, or to strong currents of air, such as railway and other carriage, ship, and signal lights.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent-agents. *Improvements in the manufacture of fuel.* (A communication.) Patent dated August 12, 1853. (No. 1884.)

This invention relates to the manufacture of fuel from small coal; and consists—1. In the use of Trinidad, Cuba, or other similar bitumen, alone or combined with resin, as a means of solidifying or agglomerating small coal into masses fit for moulding; and 2. In the use of water in which clay has been dissolved, and allowed to subside, with or without the addition of gum arabic, gum-senegal, or other similar gum or glutinous matter, for the purpose of moistening the mixture of small coal, resin, and bitumen.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent agents. *Certain new compounds which may be employed for mouldings, frames, and many purposes to which wood, papier maché, plaster, gutta percha, and other like substances are applicable.* (A communication.) Patent dated August 12, 1853. (No. 1885.)

Claims.—1. The production of a new compound or compounds by combining wood sawdust with gelatine or gelatinous materials, and oil of tan or its chemical equivalent. 2. The production of a new compound or compounds by combining metallic sulphates with gelatine or gelatinous materials.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Holborn, City, London. *Improvements in the combination of glass with iron or other metals, to serve for the construction of floors, walls, roofs, or parts thereof, or of windows for buildings; and also of translucent pavements, lights for subterranean apartments, and for any purpose for which a translucent medium possessing great strength is desirable.* (A communication.) Patent dated August 6, 1853. (No. 1840.)

The more important part of this invention consists in making rebates round the openings in the grating large enough to receive the glass, with a band of packing or cement extending all around and under or inside it, and in making the sides of the glass and of the rebate of such form, that when the packing or cement is in place the glass cannot be withdrawn.

SOUTHAN, HENRY, of Gloucester, gentleman. *Improvements in ploughs.* Patent dated August 6, 1853. (No. 1842.)

These improvements consist in forming the share of the plough in the form of a screw, which, revolving as it proceeds through the soil, turns it over; and in making the beam somewhat more curved than it is in ordinary ploughs.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *Improvements in transmitting power.* (A communication). Patent dated August 6, 1853. (No. 1844.)

The patentee describes an apparatus to be employed for increasing the effect of any impulsive force, in which apparatus the said force is applied to and transmitted by a crank, and its effect is expected to be increased by a weight rolling on a cogged wheel in a peculiar manner.

GREEN, JOHN, of Queenhithe, London. *Improvements in printing machinery.* (A communication.) Patent dated August 6, 1853. (No. 1845.)

In this invention one or more forms are fixed to one part of the cylinder, and the other part is used as a distributing surface for the ink. There are acting with the cylinder as many pressing-rollers as it is desired to obtain impressions in each revolution of the cylinder. The type is inked by inking rollers after passing each of the pressing-rollers. The paper is supplied to the machine in long uncut webs, and is cut after it is printed.

MOUTIS, HENRY DES, of Paris, France. *An improved system of publicity.* Patent dated August 9, 1853. (No. 1853.)

This invention consists in printing advertisements at the backs of programmes of exhibitions, concerts, &c., &c.

BRUCK, LOUIS HARTOG, of Mark-lane, London, gentleman. *Improvements in the construction of tunnels, sewers, drains, pipes, tubes, channels, and other like conduits, for hydraulic or pneumatic purposes.* Patent dated August 9, 1853. (No. 1854.)

This invention consists in "the construction of conduits, of any size or form, of calcareous cements, for the conveyance of liquids or of æriform fluids."

PETERS, HENRY, of Birmingham, Warwick, manufacturer. *Improvements in pens and penholders.* Patent dated August 10, 1853. (No. 1856).

The improvements in pens consist in making them of tortoise-shell. Mr. Peters presses thin sheets of the shells into a semi-cylindrical form, and from these cuts and fashions the pens by any suitable means.

TAYLOR, JOHN GEORGE, of Glasgow, Lanark, North Britain, merchant. *Improvements in desks, workboxes, dressing-cases, tea-caddies, and similar articles, and in the arrangements and fittings thereof.* Patent dated August 10, 1853. (No. 1859.)

Mr. Taylor makes the body of the desk of any cheap common material, then covers it over with the "agate" composition (Prosser's patent) formed into sheets or ornamental pieces, so that the desk may have the appearance of being wholly composed of this material.

RUSHBURY, JOHN, of Wolverhampton, Stafford, locksmith. *A new or improved lock.* Patent dated August 11, 1853. (No. 1866.)

In Mr. Rushbury's lock the tumblers resemble those ordinarily used, but instead of being kept in their places by the ordinary kind of spring he employs compound bars of brass, the elasticity of which is sufficient for the purpose. The inventor also employs a peculiar arrangement of a plate and pins for the purpose of covering or exposing the key-hole, as may be convenient.

STEPHENSON, HENRY PALFREY, of Thurloe-place, West Brompton, Middlesex, civil engineer. *Improvements in the construction of suspension bridges.* Patent dated August 11, 1853. (No. 1871.)

These improvements relate to bridges constructed upon the taper-chain principle, and are intended to render the structure more rigid and secure. The chief part of the invention relates to the transverse girders, which are made by Mr. Stephenson of two strips of wrought iron, having wooden filling pieces between them. These filling pieces may be either in one, or divided into a series of cubical blocks, and the wrought iron plates are connected together by bolts.

LAVENDER, EDWARD, and ROBERT LAVENDER, both of Deptford, Kent, general traders. *An improved apparatus for preparing the materials employed in the manufacture of certain composition fire lighters.* Patent dated August 12, 1852. (No. 1882.)

When the resinous, bituminous, or other compositions are enclosed in the inventors' apparatus and heat is applied, the machine is made to rotate, and every part of the enclosed substances becomes equally heated and impregnated, and the materials are thus better prepared than by the ordinary methods.

PROVISIONAL PROTECTIONS.

Dated October 11, 1853.

2330. Charles Rowley, of Birmingham, Warwick. Improvements in ornamental dress-fastenings.

Dated November 14, 1853.

2638. William Anderson, junior, and Alexander Wark Murphy, of Glasgow, Lanark, North Britain,

manufacturers. Improvements in that class of ornamental fabrics usually termed "Ayrshire sewed work."

Dated December 10, 1853.

2880. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in moulding, more particularly applicable to toothed wheels. A communication from M. de Louvrié, of St. Marc, France, engineer.

Dated December 20, 1853.

2964. Archibald Thomson, of Glasgow, Lanark, North Britain, iron shipbuilder. Improvements in setting out and marking the rivet-holes in the plates used in constructing iron ships, boats, boilers, and other vessels.

Dated January 24, 1854.

174. Adderley Willcocks Sleigh, of Weymouth-street, Portland-place, Middlesex, London. Creating a continual self-acting, self-sustaining new motive power, applicable to every purpose requiring speed, motion, and power, together or separately.

176. Jean Baptiste Moinier, of La Villette, Paris, France, gentleman. A new chemical process for the production of sulphates of soda, potassa, and alumina, of nitrates of soda and potassa, of soap, and of hydrochloric, sulphuric, stearic, morgaric, and elaidic acids.

Dated January 28, 1854.

209. Jules Joseph Louis Fournier, gentleman, of Montpellier, France. An improved mode of obtaining alcohol.

211. Mead Terry Raymond, of Clement's-lane, Lombard-street, London, general commission-agent. Improvements in apparatus for retarding and stopping trains of carriages on railways.

213. Wellington Williams, of Cheapside, London, manufacturer. A method of and apparatus for heating the heaters of box-irons and other like purposes.

215. Donald Bethune, of Toronto, Canada West. Improvements in the construction of vessels propelled by steam or other motive power.

217. William Woolford, of Bowling New Dye Works, Bradford, York. Improvements in pressing and watering moreens and other fabrics.

Dated January 30, 1854.

219. Peter Armand Lecomte de Fontainemoreau, of South-street, Finsbury. Improved means of preventing accidents on railways. A communication.

221. Henry Jeremiah Iliffe, of Birmingham, Warwick, button-manufacturer, and Nehemiah Brough, of the same place, tool-maker and machinist. Improvements in the manufacture of buttons, and in attaching them to articles of wearing apparel.

223. William Hodgson, of Wakefield, York, engineer. Improvements in machinery for the manufacture of looped fabrics.

225. Joseph Rock Cooper, of Birmingham, Warwick, gun-maker. Improvements in preparing or constructing and dressing rolls for rolling gun-barrels, tubes, and bars.

227. John Kershaw, of Dublin, Ireland, engineer. Improvements in steam engines.

229. Robert Chapman, of Eaton, Norwich, miller. An apparatus for regulating the feed to millstones.

Dated January 31, 1854.

231. Arnold Morel Fatio, merchant, and François Verdeil, medical doctor and chemist, both of Paris, France. Improvements in preserving animal and vegetable substances.

233. Thomas Hollingsworth, of Nottingham. Improvements in forming or applying tags to laces.

235. Caroline Erckmann, of La Villette, near Paris, France. The manufacture of telegraphic wires.

237. Richard Oliver, Robert Barlow, and James Blundell, of Manchester, engravers and copartners. Certain improvements in machinery or apparatus for embossing and cutting out patterns or devices for the ornamentation of textile fabrics or other materials or surfaces.

239. Louis Christian Koeffler, of Rochdale, Lancaster, bleacher and dyer. Certain improvements in the method or process of scouring, washing, and oiling wool and other textile materials, for the purpose of spinning, and in the machinery or apparatus connected therewith.

241. Pierre Joseph Meeus, of Paris, France, engineer. Improvements in producing metallic surfaces.

243. Richard Archibald Brooman, of 166, Fleet-street, London, patent-agent. Improvements in the manufacture of steel. A communication.

245. James Jackson, of Broad-street, Golden-square, Middlesex, and George Morris Hantler, of Sloane street, Middlesex. Improvements in baths.

Dated February 1, 1854.

247. Henry Wickens, of Tokenhouse-yard, London, gentleman. Improvements in the mode of intercommunication in railway trains.

249. John Buchanan, of Leamington Priors, Warwick, gentleman. Improvements in propellers, and in applying them.

251. William Guest, of Lion-square, Sneinton, Nottingham. Improvements in machinery for making whips, parts of which improvements are also applicable to the manufacture of braids and wire nets.

253. Albert Robinson, of Whitehall-place. Improvements in preparing compositions for coating iron and other ships' bottoms and other surfaces.

255. John Jobson, of Litchurch Works, near Derby, ironfounder, and Robert Jobson, of Holyhall Works, near Dudley, Staffordshire, ironfounder. Improvements in the manufacture of moulds for casting metals.

257. James Hargreaves, cotton-spinner, and James Fletcher, manager, both of Facit, near Rochdale, Lancaster. Certain improvements in machinery for preparing to be spun cotton and other fibrous materials.

259. Joseph Beattie, of Lawn-place, South-street, Lambeth, Surrey, engineer. Improvements in furnaces, and in the treatment of steam.

Dated February 2, 1854.

261. Adolphe Mohler, manufacturer, of Obernay, (Bas Rhin) France. Certain improvements in apparatus for lubricating machinery.

263. Charles Emile Paris, chemist, of Paris, France. Certain improvements in covering with metals certain metallic surfaces.

265. John Hamilton Glassford, of Glasgow, Lanark, North Britain, lithographer. Improvements in lithographic and zincographic printing.

Dated February 3, 1854.

268. Auguste Edouard Loradoux Bellford, of Castle-street, London. A new system of apparatus to be called "Atmospheric Post," for transmitting letters and messages, and applicable to railways, and as a speaking-trumpet. A communication.

270. Robert Brockman Newhouse, of Uckfield, Sussex, surgeon. Improved apparatus for conducting off the gases of combustion from open fireplaces.

272. Alfred Lannes, Marquis of Montebello, proprietor and champagne wine-merchant, of Mareuil-sur-Ay, France. An improved propeller applicable to the navigation of ships and other vessels.

274. Edward Howard and David Porter Davis, of Massachusetts, United States of America. Improvements in machinery for sewing cloth or other material. A communication by Sylvester H. Roper, of Massachusetts.

Dated February 4, 1854.

276. William Gosling, of Edward-street, Woolwich, Kent. An invention for the purpose of preventing collisions on railways, which he has designated "Gosling's Railway Danger Signal."

278. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in springs applicable to railway carriages and other uses. A communication.

280. William Little, of the Strand. Improvements in distilling or obtaining products from coals and bituminous substances.

282. Edwards Cole, of Hemming's-row, Westminster, leather case-maker. An improvement in the frames of travelling-bags.

Dated February 6, 1854.

284. Dominiques Deyres, engineer, of Bateman-buildings, Soho-square, London. Certain improvements in drilling or boreing.

288. Thomas and William Hemsley, of Melbourne, Derby, lace-manufacturers. Improvements in the manufacture of looped fabrics.

290. Andrew Duncan, of Glen House, Denny, Stirling, North Britain, paper-maker. Improvements in bleaching.

292. Peter Trumble, of Huddersfield, York, painter and gilder. Improvements in paper-hangings.

Dated February 7, 1854.

294. James Murdoch, of Staple-inn, Holborn, Middlesex. An improved process for manufacturing paper. A communication.

296. Edward Poitiers, of Malden-terrace, Haverstock-hill, Middlesex, gentleman. A new material for the manufacture of cordage, canvas, and linen, and generally as a substitute for hemp and flax.

298. William Joseph Curtis, of Birchin-lane, London, civil engineer. An improved railway signal, especially adapted as a danger-signal.

300. Alphonse François Damiens Duvillier, of Rue du Bouloi, Paris, France. A new system of remontoirs, or apparatus for winding up watches without a key.

302. James Taylor, of Carlisle, Cumberland, engineer; Isaac Brown, of the same place, merchant and field seedsman; and John Brown, of Oxford-street, Middlesex, silk-mercer. Improvements in the charring of vegetable and animal substances.

304. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improved machinery for heckling flax and other fibrous materials. A communication.

Dated February 8, 1854.

306. Edward Thomas Rees, of Prospect-place, Swindon, Wilts, draughtsman. Improvements in pressure slide-valves in steam engines, to be called the "anti-pressure valve."

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

319. John Taggart, of Massachusetts, United States of America. An improved machine for excavating earth. February 9.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," February 17th, 1854.)

2129. Alexander Wallace and George Galloway. Improvements in the construction of portable articles of furniture.

2143. Henry Kraut. Improvements in tools or implements to be used for boring or cutting rock or other hard substances, for the purpose of blasting.

2161. Baldwin Fulford Weatherdon and Matthew Slade Hooper. Certain improvements in railway signals.

(From the "London Gazette," February 21st, 1854.)

2181. Ferdinand Potts. Improvements in the manufacture of taper tubes, and in the apparatus connected therewith.

2217. Isaac Bury and William Green. Improvements in treating, stretching, or finishing textile fabrics, and in machinery or apparatus for effecting the same.

2279. John Mason. Improvements in preparing cotton for spinning, and in machinery or apparatus for effecting the same.

2282. Julius Schönemann. New constructions of weighing-machines. A communication.

2300. Robert James Corlett. Improved machinery for preparing or scutching flax and other fibrous materials requiring such an operation. A communication from Mr. Benjamin Delattre, of Setques, France.

2338. George Frederic Goble. Improvements in apparatus for signalizing and stopping railway trains.

2366. Andrew M'Lean and William Fraser Rae. Improvements in apparatus for the manufacture of aerated liquids.

2368. Mary Ann Davy. Improvements in the mechanical application of brushes.

2378. John Henry Johnson. Improvements in the manufacture of iron. A communication.

2380. Auguste Edouard Loradoux Bellford. Certain improvements in the treatment of copper ores. A communication.

2404. Emory Rider. Improvements in the manufacture or treatment of gutta percha, being improvements upon the invention secured to him by letters patent dated 20th day of July, 1852. Partly a communication.

2408. John Wright Child and Robert Wilson. Improvements in regulating motive-power engines

2457. Jean Baptiste Verdun. Improvements in the construction of globes.

2463. Alfred Vincent Newton. An improved construction of printing-press. A communication.

2468. Marcus Davis. Improvements in the treatment of fibrous materials other than flax and hemp. A communication.

2473. Edward Joseph Hughes. Improvements in machinery or apparatus for sewing or stitching.

2784. Edward Keating Davis. Improvements in machinery for making pipes, sheets, still-worms, and other articles from that class of metals called soft metals, as lead, tin, zinc, bismuth, or alloys of soft metals that are capable of being forced out of metal receivers or chambers through dies, cores, &c.

2834. William Edward Geine. An improvement in treating or preparing paper.

2862. Andrew Shanks. Improvements in instruments and apparatus for indicating or measuring weights and pressures.

8. Henry Lee Corlett. Improvements in caout-

choue springs for locomotive engines and tenders, railway carriages and wagons.

172. Richard Archibald Brooman. Improvements in extracting copper from the ore. A communication.

192. Thomas Wicksteed. Improvements in the manufacture of sewage-manure.

193. Thomas Wicksteed. Improvements in the manufacture of sewage-manure.

194. Thomas Wicksteed. Improvements in the manufacture of sewage-manure, and in apparatus for that purpose.

213. Wellington Williams. A method of and apparatus for heating the heaters of box-irons, and other like purposes.

215. Donald Bethune. Improvements in the construction of vessels propelled by steam or other motive power.

224. Benjamin O'Neale Stratford, Earl of Aldborough. Improvements in aerial navigation.

227. John Kershaw. Improvements in steam engines.

233. Thomas Hollingsworth. Improvements in forming or applying tags to laces.

241. Pierre Joseph Meeus. Improvements in producing metallic surfaces.

243. Richard Archibald Brooman. Improvements in the manufacture of steel. A communication.

245. James Jackson and George Morris Hantler. Improvements in baths.

250. John Burgum. A new or improved self-acting damper for the furnaces of steam boilers.

251. William Guest. Improvements in machinery for making whips, parts of which improvements are also applicable to the manufacture of braids and wire nets.

253. Albert Robinson. Improvements in preparing compositions for coating iron and other ships' bottoms and other surfaces.

264. James Stevens. Improvements in apparatus for giving railway-signals.

265. John Hamilton Glassford. Improvements in lithographic and zincographic printing.

274. Edward Howard and David Porter Davis. Improvements in machinery for sewing cloth or other material. A communication from Sylvester H. Roper, of Massachusetts.

288. Thomas and William Hemsley. Improvements in the manufacture of looped fabrics.

302. James Taylor, Isaac Brown, and John Brown. Improvements in the charring of vegetable and animal substances.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed February 17, 1854.

1923. Felix Alexandre Victor Delarbre.
1924. Thomas Clark Ogden and William Gibson.
1926. Thomas Grimsley.
2032. Augustino Carosio.
2886. Thomas Hollinsworth.
2962. James Burrows.

Sealed February 18, 1854.

1930. David Chalmers.
1932. Alexis Pigé.
1937. William Cornelius.
1938. Auguste Mathieu Maurice de Bergevin.

Sealed February 20, 1854.

1944. James Kimberley.
1968. George Culverhouse.
2038. Albert Nagles.
2227. Jean Alexander Labat, junior.
2690. Moses Poole.
2751. Auguste Edouard Loradoux Bellford.
2752. Charles Calixte André Grenier.
2794. Auguste Edouard Loradoux Bellford.
2841. Lewis Harvey Bates.
2871. William Schaeffer.
2901. John Wibberley.
2930. Samuel Smith.
2931. Alexander Parkes.
2940. Caleb Bedells.
2960. Emile Victor Felix Lemaire.

Sealed February 22, 1854.

1954. Victor Emile Warmont.
1964. William Mann.
1978. John Shaw and Joseph Steinthal.
2003. Peter Armand Lecomte de Fontainemoreau.
2125. John Wakefield and James Baskerville.
2153. William Shelbourne Icely.
2381. Charles Joseph Louis Cloux, jun.
2385. Antoine Corvi.
2420. André Alexander Beaumont.
2542. Benjamin Butterworth.
2733. Hugh Mason and John Jones.
2782. John Elce.
2840. William Slater and Robert Halliwell.
2878. Charles Coates.
2919. William Binnion.
2921. William Tranter.
2963. James Burrows.
3004. James Taylor.
3016. Mary Phillips.
3017. Amédée François Rémond.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

P. Hart, Manchester.—The plan of working mine pumps by connecting the pump-rod directly to the piston of a steam engine set over the shaft, is not, as you suggest, a new idea. It was first proposed by Watt in contemplating the application of his steam engine to pumping purposes. A very fine specimen of the arrangement is in operation at the Earl of Moray's coal works at Kelty, near Blair-adam, in Fifeshire.

Edward Cocks, Southampton.—Your proposed method of communicating between different parts

of a railway train has been completely anticipated by Mr. A. E. Brae, who has a patent for it, dated January 24, 1853 (*Mech. Mag.* vol. lviii. p. 249, and vol. lx. p. 134).

Wm. Carrole, Manchester.—Your remarks on W. T.'s Theory of Electricity were never received.

J. Hope.—We do not see that you could add much that is important to your former letter. We shall be happy, however, to receive a further communication from you if you think fit to send one. We cannot advise you to go to any expense in carrying out your plan.

J. Davidson, Edinburgh.—The list you allude to was discontinued, because it was considered unnecessary; but as several of our subscribers have expressed their anxiety to see it continued, we shall probably resume the publication of it at the end of the present volume. There will be none published to accompany the last volume.

W. Woodward.—We are not acquainted with any method of performing the operation you mention.

J. A. W. Stoke.—Your paper on Mechanics' Institutes is received with thanks.

E. E. H.—Your invention is very similar to several that have been already suggested.

A Subscriber since 1824.—The question you have proposed, is one which experiment only can solve; we quite agree, however, with your conjecture as to the probable law which will be found to hold in the matter.

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GRIMSLEY'S PATENT BRICK AND TILE MACHINERY.

Fig. 2.

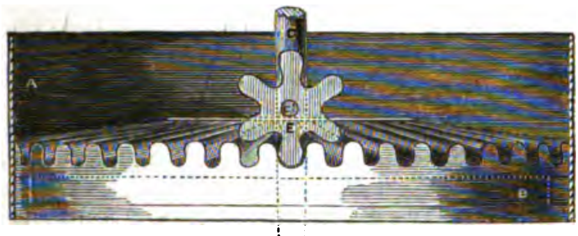
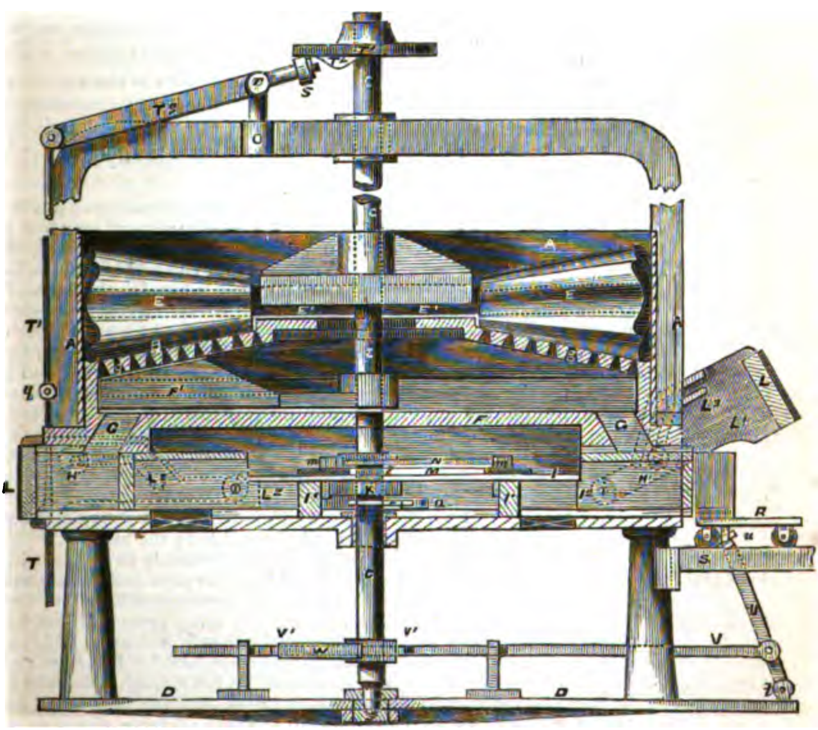


Fig. 1.



GRIMSLEY'S PATENT BRICK AND TILE MACHINERY.

(Patent dated August 17, 1853.)

Mr. Grimsley, a sculptor, of Oxford, has lately patented improved machinery for the manufacture of bricks, tiles, pipes, and pottery; the first part of which consists of a mill for grinding or pugging the clay, and crushing any stones or foreign matter that may be mixed with it, in order to render the clay more plastic. The top and bottom of the mill are composed of two fluted conical surfaces, the top cone being inverted; both the upper and under surfaces are free to revolve round a central shaft. Between the top and bottom surfaces and equidistant from them, he mounts one or more fluted conical rollers, which are free to revolve round their axes only. Motion being communicated to either of the surfaces, or to one of the conical rollers, all the rollers are caused to revolve round their axes, and to impart rotary motion to the top and bottom surfaces in a contrary direction. When the top and bottom plates are used, the top surface has apertures to admit the clay, which is fed in through the top frame of the mill, while the under surface has also apertures or perforations through which the clay is pressed by the conical rollers into a receiving-box under the mill, in which there is a scraper or coulter revolving, which presses the clay out of the bottom chamber into the moulds, or through dies fixed at each end of the press, either horizontally or vertically. Or he dispenses with the upper surface, and makes the lower one a fixture, the conical fluted rollers turning upon shafts projecting from a central main shaft, and revolving with it, the clay being pressed through perforations made between the flutes of the under surface. When the clay has been received into the receiving-box, it is pressed by another part of the machinery into moulds, as before described; and as soon as the pressure has been applied by a piston or pistons, a cam or eccentric motion causes the front of the mould first to recede and then to rise up, when the piston further advances, and presses the brick or other article out upon a travelling-bed, which presents itself to the front of the mould, while a wire or other cutter is brought between the brick or other moulded article, and the back of the mould or piston, and thus clears the one from the other.

The accompanying engravings represent a machine constructed according to this invention; fig. 1 being a longitudinal section of it, and fig. 2 a cross section of its upper part. A A is a circular box or case, the lower surface, B, of which is conical and fluted, in the manner shown in fig. 2. C is a central vertical shaft, the lower end of which turns in the step, *f*, on the base-plate, D. *g g* are series of perforations made between the flutes of the conical surface, B. These perforations are made taper, so that the clay will more easily pass through and clear the holes. E E are fluted conical rollers, which are free to turn upon the shaft, E^1 E^1, as their axes. These shafts project from the vertical shaft, C, and revolve with it, causing the conical fluted rollers also to revolve and travel round and upon the lower surface, B, the teeth of the rollers gearing into those on the surface, B, whereby any stones or other foreign matters are crushed, and the clay is well worked and rendered plastic. As the rollers revolve, the pugged clay is forced through the perforations, *g g*, whence it falls upon the plate, F, and is collected by a revolving scraper or colter, F^1, which is attached to the vertical shaft and rotates with it. The clay, as it is collected, is forced through the apertures, G G, in the plate, F, into the rectangular boxes, H H^1, one at each end of the brick-machine. I I is the piston, which is formed of a strong rectangular frame, divided across at equal distances from the end-plates, *h h*, by the bars, I^1 I^1. K is a cam, keyed upon the shaft, which cam, as it revolves, comes alternately in contact with the bars, I^1 I^1, and thereby serves to bring the end-plates, *h h*, of the piston alternately against the clay in the rectangular boxes, H H^1, with a degree of pressure sufficient to form or mould the clay into the shape of the intended brick, the clay being prevented from forcing out by the end-covers, L L. These end-covers are attached to side-frames, L^1 L^1, which have their fulcra at *i i* in the end of two side connecting-frames, L^2 L^2. L^3 L^3 are slots, of the peculiar shape represented, formed in the side-frames, L^1 L^1, through which short pins or spindles projecting from the sides of the framework of the machine, are passed, having small friction-rollers, *o*, secured to them, which bear against projecting pieces or ridges upon the side-frames, L^1, of a corresponding shape to the slots, L^3. M is a plate, which

is placed across the machine, and attached to the side connecting-frames, L^2 L^2. This plate is free to slide to and fro in guides, when actuated by the quadrant, N, attached to and revolving with the vertical shaft, C, a slot, *l l*, being formed in the plate to allow of such traverse of the plate. *m m* are small friction-rollers mounted upon spindles projecting from the plate, M, and against which the quadrant, N, strikes in its revolution, whereby the plate is caused to traverse along the top of the piston-box, carrying with it the side-frames, L^2 L^1, and end-cover, L, when the straight portions of the slots, L^3, traverse along the spindle of the friction-rollers, *o*, until they come to the inclined part, when the onward progress of the plate, M, causes the inclined portions to traverse the spindle, whereby the end-cover, L, is raised up clear from the brick and mouth of the press, so as to admit of the piston receiving a further impulse from the cam, P, mounted upon the vertical shaft which, in its revolution, comes against the stop, Q, on the inside of the framework of the piston. By this means the brick receives a further acceleration, so as to push it beyond the mouth of the press on to a travelling-carriage or web, R, which is supported upon wheels, and is caused to travel along a railway, S, in the manner presently to be described. T is a frame, across which is stretched a wire or cutter. T^1 is a rod, the lower end of which is connected to an eye, *q*, on the top bar of the frame, T, while the other end is attached to the lever, T^2, having its fulcrum at *r*, and supporting at the opposite end a friction-roller, *s*. T^3 is a disc, keyed upon the shaft, C, having upon its under edge and projecting from it a cam, T^4, which, as the disc revolves with the shaft, comes in contact with the friction-roller, *s*, and thereby depresses that end of the lever, T^2, and consequently raises the other end, and with it the rod, T^1, and frame, T, whereby the cutter or wire, *p*, is passed between the moulded brick or other article, and the end-plate, *h*, and the brick is thereby severed or cut off, and rendered free to be carried away by the travelling-carriage, which is actuated by the following arrangement:—U is a lever, centred at *t*, the upper end of which terminates in a fork, *u*, which takes into a socket beneath the carriage. V is a rod, which is attached to the lever, U. V^1 is a rectangular frame, connected to the rod, V, and embracing the shaft, C, which has a pair of cams, W W, placed at right angles, the one to the other, so that as the cams revolve they alternately come against the ends of the frame, and so serve to push out the rod, V, and with it the lever, U, carriage, R, and brick or other moulded article deposited upon it by the piston. Although not shown in the engravings, a similar contrivance for cutting off the brick, and also for carrying it away when so moulded, is arranged at each end of the machine. The revolution of the cams acts upon the opposite ends of the frame, V^1, so as to bring back the carriage to receive a fresh brick. It will be necessary to so arrange and adjust the positions of the several cams upon the shaft, C, that the different operations of pressing the brick, raising the end-cover, and ejecting the brick from the press, the cutting operations, and the travelling movement of the carriage, shall all follow in their proper consecutive order, and also that sufficient time shall be allowed for the action of the several cams, so as to prevent their interfering with each other. By this arrangement of the machine, bricks or other articles are moulded and pressed with great solidity at each end by the reciprocating action of the piston. Should it be desired, the bricks may be perforated, wholly or partially, by facing the end-plates, *h h*, of the piston with a series of projecting prongs of the requisite length, which, as the pistons alternately move towards the mould-boxes, H H^1, enter the clay, and thereby perforate the moulded brick, the reverse action of the piston withdrawing the prongs, and at the same time perforating the moulded brick at the opposite end of the machine. When great pressure is not required, the inventor places the moulds or dies under the aperture leading from the lower chamber of the mill, when, by the pressure of the scraper or coulter passing over the mould, the clay is forced into the mould or through the dies.

ON THE TRANSMISSION OF ELECTRICITY BY FLAME AND GASES.

The following contains the substance of a lecture on the above subject recently delivered at the Royal Institution, by W. R. Grove, Esq., F.R.S.

In the year 1730, Mr. Stephen Grey, a pensioner of the Charter House, was led, by pursuing a series of ingenious experiments, to the important discovery that bodies might be divided into two classes, conductors and non-conductors of electricity. Subsequent discoveries led to the knowledge that different bodies conduct electricity, not only very differently as to degree, but also differently as to mode, and as to the changes which the bodies themselves experience while conducting electricity. We thence get conduction without apparent change, as by the metals—conduction dependent upon chemical change, as by electrolytes; and then again in effects of trans-

mission not usually included under the term conduction, we get the discharge by carrying or convection, and by disruption, as in the spark.

In the year 1852, Mr. Grove communicated at an evening meeting of the members of the Royal Institution, his researches on the disruptive discharge, showing by the oxidation and reduction of the terminal surfaces, a state of chemical polarity in the gaseous intervening medium, antecedent to the discharge, the discharge consisting of a subversion of this polarity attended with intense local heat, and a transmission of minute particles of the terminals between which it took place.*

In what may be termed Pneumatic Electricity, or the electrical effects produced on and by gases, there seems some reason to believe that the molecules conduct, or in other words that at indefinitely minute spaces, electricity can pass without the phenomena of disruptive discharge: for instance, in the gas battery, either the molecules must conduct, or the gases must by contact with the platinum be brought into a liquid state.

The effects of rarefaction on gases (as by the air-pump) tends to render the disruptive discharge more facile, and to enable electricity of the same degree of intensity to pass across much larger spaces than it would when transmitted across gases in a dense state.

The next inquiry is whether the effect of rarefaction by heat is the same as that by mechanical attenuation; and heated gas was shown by Mr. Grove to facilitate the disruptive discharge of electricity: so strikingly was this evidenced with flame, that when the flame of a spirit lamp was held near the terminal point of the coil apparatus of Ruhmkorff (the coatings of a Leyden phial being connected with the secondary coil, and the terminals being separated to a distance far beyond that at which the spark would pass in cold air), the spark darted to and along the margin of the flame, and could be curved or twisted about in any direction, at the will of the experimenter, giving a striking illustration of the crooked form of lightning, and of the probable reason why it does not pass in straight lines, the temperature of the air being different at different points of its passage, and much of this variation of temperature being in all probability occasioned by the mechanical effect on the air of the discharge itself.

No amount of rarefaction has hitherto shown anything like *conduction* in gases at ordinary temperatures; but on the other hand, flame does give distinct evidence of conduction without disruptive discharge, and an experiment was made demonstrating this.

Is this effect of flame due simply to its consisting of highly-heated gas? or is it due to the chemical action taking place throughout the whole structure of the flame?

When closely approximated metals are brought to the point of visible ignition, signs, but very feeble signs of transmission of electricity take place. M. E. Becquerel has recently published some very interesting experiments on this subject, and Mr. Grove not by means of M. E. Becquerel's plan, but by igniting by the voltaic battery two platinum wires placed close to each other in an exhausted receiver, and connecting them with a third voltaic battery, had obtained slight deflections of a delicate galvanometer.

These effects are, however, far inferior to those shown by flame, and appear to depend more upon the state of the terminals than upon the state of the intervening gas:—thus, until the terminals attain a red heat, no transmission takes place, whatever be the degree of attenuation of the gas; while if the terminals have attained a red heat, the current is much more easily transmitted by rare than by dense gas. Thus alterations in the density of the gas do not appear to affect the transmission, until a certain definite change has taken place in the state of the terminals. Reasoning from these effects, and bearing in mind the effect of rarefied gas on the disruptive discharge and the quasi-radiation of matter in the phenomena elicited by Moser and others, Mr. Grove inclined to the opinion that the transmission across heated gas differed specifically from that across the flame, the former being in some respects analogous to the disruptive while the latter resembled the electrolytic discharge.

Flame, moreover, has been observed to conduct better in one direction than another, and the question next arises, will flame produce or generate a voltaic current? M. Hankel and M. Buff have published papers showing, by the use of highly sensitive galvanometers, a current apparently produced by flame, which passes from the upper to the lower part of the flame. M. Buff attributes this current to thermo-electricity—the flame being a conductor and two metals in contact with different parts of it, the thermo-current passes from the hotter to the cooler metal, and hence the result.

Mr. Grove in studying this subject, and without having then read the papers of Hankel and Buff, found the results so varying in ordinary flame that he could come to

* Phil. Trans., 1852, p. 87.

no satisfactory conclusion; he was then led to think, that as in the flame of the blow-pipe, the direction or line of combustion is more definite than in ordinary flame, he might get more definite results. He experimented with the latter flame, and immediately got very distinct evidence of a current not due to thermo-electricity, as it could be made to conquer both the effect of the thermo-flame current, noticed by Buff, and of any thermo-current excited in the junction of the wires exterior to the flame.

This current, which Mr. Grove termed the flame current proper, moves from the root towards the point of the blow-pipe flame—the best points for placing the collecting spirals or plates of platinum being for the one, a little above the root or base of the blue cone, and for the other, in the full yellow flame a little beyond the apex of the blue cone.

As the latter metal is much more heated than the former, the thermo-flame-current is opposed to, and though it by no means destroys, it tends to weaken the effect of the flame current proper; if, then, this metal can be adventitiously cooled, we should have the two currents co-operating, instead of conflicting; and so experiment proved, for by using a capsule of platinum filled with water in the full flame, and a coil or sheet of platinum foil at the base, a very marked current resulted. By arranging in a row of jets, worked by a large bellows, a sheet of platinum foil placed just over the roots of the flames, and a trough of platinum foil filled with water, just beyond the points of the blue cones, the large galvanometer of the Institution was deflected to 30° or 40°, so as to be easily visible to the audience; the deflection being in the reverse direction upon reversing the connections respectively with the plate and trough. The same apparatus will also readily decompose iodide of potassium; iodine being evolved at the platinum point in connection with the trough.

There was another apparatus on the table for arranging the flame battery as an intensity series. The direction of the current is from the points in the flame where combustion commences, to those where it concludes; it appears to be transmitted by a chain of chemical action taking place between these. Though speaking with some reserve on the theory of the phenomenon, Mr. Grove could at present see no objection to its being regarded as a current produced by chemical action; the platinum at the commencement of action representing the zinc which burns or combines with oxygen; that at the conclusion, representing the platinum, or the points where chemical action concludes, and a tendency to reduction or deoxidation is manifested. The distinction being that the generative chemical action, instead of taking place, as in the ordinary battery only at the zinc surface, and being simply transmitted by the electrolyte, takes place throughout the intervening section of flame; and thus, within certain limits, the intensity of the electricity increases with the distance of the plates, instead of decreasing as in the ordinary battery.

SOLUTION OF DYNAMICAL PROBLEM.

(ANTE, PAGE 11.)

SIR,—No solution of the problem proposed by your correspondent "Tyro," in No. 1587, of your Magazine, has yet appeared. I ascribe this to the want of clearness in the statement of the question; for it belongs to a class exceedingly simple in mode of treatment. I have tried to make out the particular data put forth in it; but I have given that up. I send you the solution in a general form, thinking it may find sufficient favour for insertion in the *Mechanics' Magazine*. Let me, however, justify my imputation of obscurity to the mode of statement used by "Tyro." He says, "Let there be three balls of the same weight and material, and all homogeneous, with the exception of the loading after mentioned." Now, it appears to me that three such balls must necessarily be of the same dimensions. But "Tyro" says, that one of these being loaded at the centre, another at the circumference, the load being one-third of the entire weight in each case, the diameter of the unloaded ball is represented by three; that of the loaded by two. I must confess, at the risk of being thought exceedingly dull, that I do not precisely understand how, by loading two out of three equal balls, we can make their diameters less than the diameter of that left unloaded. There is perhaps another view of the matter. We will suppose the weight of the ball which is loaded at its centre (with its load) to be equal to that of the unloaded ball. Now, one-third of this weight is collected within the surface of a sphere whose radius is $\frac{1}{4}$, the radius of the unloaded ball being $\frac{3}{2}$. The outer shell therefore lying between the surface of the loading and the surface of the ball and consisting of material of the same density as that of the unloaded, must be two-thirds of the entire weight. From this we get the following equation for finding (r) the radius;

$$\frac{4}{3}\pi r^3 - \frac{4}{3}\pi\left(\frac{1}{4}\right)^3 = \frac{2}{3} \times \frac{4}{3}\pi\left(\frac{3}{2}\right)^3$$

$$= \frac{4}{3}\pi\left(\frac{3}{2}\right)^2$$

$$r^2 = \left(\frac{3}{2}\right)^2 + \frac{1}{64} = \frac{9}{4} + \frac{1}{64}$$

$$= \frac{144+1}{64} = \frac{145}{64}$$

$$\therefore 2\ r = \tfrac{1}{4}\ \sqrt[2]{145} = 2{\cdot}626.$$

This would be the diameter of the loaded ball. So *that* view will not suit the question. The fact is, I cannot find out what *is* meant, and I imagine enough has been said to show that the terms of the problem are not of the most intelligible order.

When a sphere is set rolling on a level, there is an extraordinary kind of resistance met with, which certainly is not friction of sliding; nor can it be treated as we ordinarily treat friction of rolling, since there are no other forces acting to accelerate or retard the motion. This resistance must produce its effect by causing a vertical oscillatory motion in the body rolling, its amount depending on the kind of surface upon which the body rolls. There is little doubt, I think, that on the same surface three balls would move through the same spaces with the same velocities in the same time, if they were started with the same momentum.

But let us pass to the case of motion down an incline of 45°. Suppose initial velocity$=v$, radius $=r$, radius of gyration $=k$, weight$=w$, angular motion in time $t=\theta$. Space moved through in same time $=s$. Then we have this equation.

$$\frac{d^2\theta}{dt^2} = \frac{1}{\sqrt{2}}\ \frac{rg}{r^2+k^2}$$

$$\text{Integrating, } \frac{d\theta}{dt} = \frac{1}{\sqrt{2}}\ \frac{rgt}{r^2+k^2} + \frac{v}{r} \quad . \ . \ . \ . \ . \ . \ . \ . \quad \text{(I)};$$

$$\text{again, } \theta = \frac{1}{2\sqrt{2}}\ \frac{rgt^2}{r^2+k^2} + \frac{vt}{r}$$

$$r\theta = s = \frac{1}{2\sqrt{2}}\ \frac{r^2gt^2}{r^2+k^2} + vt \quad . \ . \ . \ . \ . \ . \ . \ . \quad \text{(II)}.$$

In (I) if we substitute the three sets of values for r and k and t, we may very readily compare the rates of motion. And doing the same in (II) we can as readily compare the spaces moved through in any given time.

If the motion be up the incline our investigation is

$$\frac{d^2\theta}{dt^2} = -\ \frac{1}{\sqrt{2}}\ \frac{rg}{r^2+k^2}$$

$$\frac{d\theta}{dt} = \frac{v}{r} - \frac{1}{\sqrt{2}}\ \frac{rgt}{v^2+k^2} \quad . \ . \ . \ . \quad \text{(A)}$$

$$\theta = \frac{vt}{r} - \frac{1}{2\sqrt{2}}\ \frac{rgt^2}{r^2+k^2}$$

$$s = r\theta = vt - \frac{1}{2\sqrt{2}}\ \frac{r^2gt^2}{r^2+k^2} \quad . \ . \ . \ . \quad \text{(B)}.$$

We may find the whole space through which the body moves up the incline by putting $\frac{d\theta}{dt}=0$, and then substituting the obtained value of t in equation (B). The comparisons must be made as before.

The values of r and k are easily enough found if the nature of the balls be clearly defined; the method of finding a radius of gyration is given in all works on dynamics.

I am, Sir, yours, &c.,

J. C.

Deptford, February 25, 1854.

BUXTON'S PATENT CONICAL MILL.

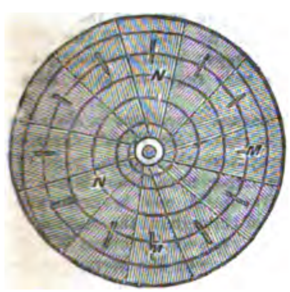
(Patent dated July 26, 1853.)

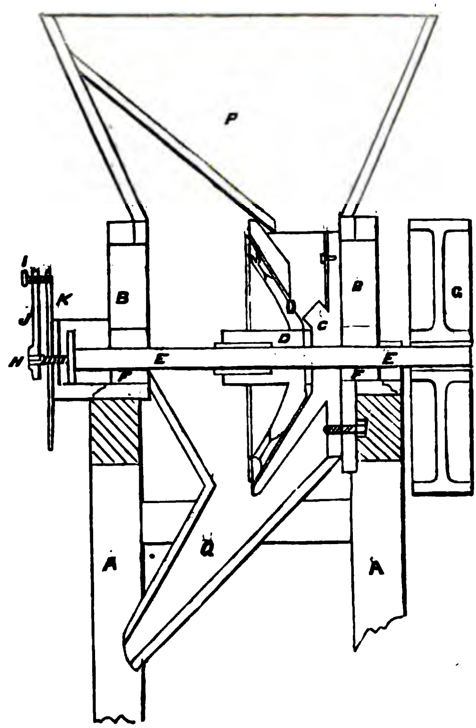
FIG. 1 is a longitudinal section of Mr. Buxton's mill; and fig. 2 is a face view of the convex cone detached, showing the apertures through it for the escape of the ground material, and the spiral groove cut on its surface. A A is a stout wooden framing, cased in on all sides, on which the working parts of the mill are mounted. B B is a cast-iron box fixed to the framing, A A, within which the grinding surfaces are placed. C is the stationary grinding surface bolted to one side of the box, B, and D the running-cone, which is keyed fast to the shaft, E. F F are the bearings for this shaft, which are fitted to the sides of the box, B, through which the shaft passes; and G is a strap-pulley, by which the shaft is driven when other power than manual

labour is employed to give motion to it. In the case of manual labour, a fly-wheel and handle would be substituted for the pulley. H is an adjusting screw, by which the position of the grinding-cones can be regulated, and the distance between them increased or diminished as may be required. I is a set-screw in one end of the arm, J, (which is fixed to the head of the adjusting-screw, H), by means of which the grinding-cones, when adjusted, are so maintained until their position is again required to be varied. K is an index-plate fixed to the front of the framing, and pierced with holes into which the set-screw, I, takes. The index is graduated so that the relative positions of the grinding-cones may be ascertained at once by inspecting it. L is a brass washer mounted on the shaft, E, between the grinding-cones, to prevent their surfaces coming into actual contact, and also to prevent the flour, &c., from working into and through the aperture at the centre of the stationary cone through which the shaft, E, passes. M M are apertures in and through the running-cone, which permit the pulverized material to be discharged as soon as ground, and serve also for the admission of air, to prevent the pulverized material from becoming heated. N is a spiral groove in the face of the running-cone, by which the grain or material to be ground is carried around during the process of grinding, so that those portions which pass away from the centre of the cones in an unground state are subjected to a further grinding action in their onward progress until they are discharged from the circumference of the base of the cones in a perfectly ground state. O is the feed aperture through the stationary cone by which the materials

Fig. 1.

Fig. 2.





are supplied to the grinding surfaces. P is the hopper of the mill, and Q the meal-spout. The grinding surfaces are dressed in the usual manner when composed of stone, as shown in fig. 2, and are similarly fluted when formed in metal.

MATHEMATICAL PERIODICALS.

To the Editor of the Mechanics' Magazine.

SIR,—I have perused the letter of Mr. Wilkinson which appeared in your last Number, and find that it is much after the style I had predicted. I am not sorry that I have not time to devote to these investigations, seeing that any remarks of mine are likely to be treated with such contempt; yet a word or two, however contemptible, may perhaps be expected.

I do not give Mr. Wilkinson much credit for his testimony, although it rests "on oath;" yet, within a moderate latitude, he may be entitled to some, if he will only make good use of it. I hope Mr. Wilkinson does not mean to charge me with having received pecuniary aid in the way he alludes to. If this "undeniable evidence" of his is intended to fall upon my head, he must be base indeed.

Mr. Wilkinson is not a fair antagonist, for he will not adhere to the truth, nor will he acknowledge when the truth is spoken. He denies, as might have been anticipated, that they had put their solutions together. Of course I have only the evidence of the individual, our "mutual friend," to stand upon, and this is sufficient. I shall not make any false assertions, or fabricate any scheme for my own safety; I only wish that I could have been of more service to my aspiring friends. My present object is to show that our "judge" is not the discreet gentleman he appears to be; and for this purpose I select the following facts from papers in my possession, which I present to Mr. Wilkinson as a "cud to chew."

During the early part of last year, Mr. Wilkinson wrote me, on several occasions, respecting solutions of questions in the then current "Diary." On one occasion he says, "I should wish to see your solution of the 'neck-and-neck race' question, 'Are the distances in Question VIII. symmetrical? and can one be deduced from another?'" On another occasion he asks, "Which is the best way of solving the second part of Mr. Waddle's question;" "I should be glad to receive any *hint* which may lead to the solution of the prize," &c. I believe that I answered some of these questions, which may serve as additional evidence to Mr. Wilkinson that I *am* implicated in the *destruction* of the "Diary." I have (in writing) another little circumstance which was furnished to me by our "mutual friend;" but as these incidents do not constitute the qualifications of a F.R.A.S., according to the usual acceptation of this symbol, I will not trouble you with it at present. I may remark, however, that these letters would *sound* much more consonant, in the present instance, if written F.A.R.S.

Still he says, "I will continue to expose the system as occasion offers." How presumptuous! "Thou hypocrite, first cast the beam out of thy own eye, and then shalt thou see clearly to cast the mote out of thy brother's eye."

I remain, Sir, yours, &c.,

S. TEBAY.

Feb. 27, 1854.

FIRE ESCAPES.

To the Editor of the Mechanics' Magazine.

SIR,—The late lamentable tragedy in Princes-street, Soho, has led, among other things, to a suggestion that the police should be furnished with *jumping-sheets;* while your correspondent, Mr. Chesterman, of Sheffield, at page 182 of your last number, recommends the use of projectiles for effecting a communication with the inmates of a burning building. Very similar propositions may be found in the earlier volumes of the *Mechanics' Magazine*, and have each been well tested. Independently of the hopelessness of attempting to get "a bracket and friction-pulley affixed to every house," the use of projectiles amid the confusion always attending the outbreak of a fire, would be at all times extremely difficult—most frequently impossible. The *jumping-sheet* has long been furnished to the City police force; they are carried upon some of the Brigade fire-engines, and by many of the Royal Society's fire-escapes, but have rarely been used, and are only regarded as a *dernier ressort.*

Of the numerous inventions in the shape of fire-escapes, that of Mr. Wivell, described in your twenty-seventh volume, page 162, has, by long experience, been found the most generally useful, and is now extensively employed throughout the metropolis, as well as in many provincial towns. Wivell's Escape, as now made by Mr. Merryweather, Long Acre, combines many important improvements; it is a very perfect machine, and has hitherto proved equal to every emergency.

The truly distressing circumstances attending the late fatal fire in Soho, reflect disgrace upon all concerned. The police-constable first called to the fire had not courage to ascend the stairs to assist the drowsy and affrighted inmates. The Irish servant girl brought a child out of the first-floor room—only to leave it in the landing, where it was stumbled over and rescued by a labourer, who rushed in to save something. The next *two* constables both ran off for the *turncock*, and from thence to the engine-

house of St. Anne's—but the engine-keeper had been discharged from his office some twelve months before, and an interdict placed upon the running of the engine! Although Spendelow, the engine-keeper, (a worthy man and excellent fireman, formerly attached to the County Fire-office), had filled this office for nearly nineteen years *gratuitously*—yet, the engine had cost the parish, containing 1,450 rate-payers, *twopence-halfpenny per week!* therefore, was considered by Mr. Churchwarden *George*, too expensive a luxury to be any longer indulged in,—human life being of no more value than

"Kettles and pans, said the bells of St. Anne's."

The parish-engine and fire-ladders being *non est*, a policeman *then* proceeded to Golden-square for the St. James's parish fire-escape; but the conductor had deserted his post, and that from Piccadilly had to be fetched, arriving just in time to be "too late."

From the peculiarity of the house in which the fire occurred, however, *no fire-escape whatever was necessary!* A man standing in the lead-flat over the projecting shop-front, easily mounted, could reach the second-floor window, at which a family of six persons were imploring aid. But alas, not one person among the gaping crowd, either police or strangers, had the presence of mind—or the manhood, to make the small exertion that would have sufficed to rescue the unfortunate inmates from a horrible death.

I am, Sir, yours, &c.,
WILLIAM BADDELEY.

13, Angell-terrace, Islington, Feb. 25, 1854.

SOLDERING CAST IRON.

To the Editor of the Mechanics' Magazine.

SIR,—Your correspondent, who signs himself "A Journeyman Blacksmith," speaks of having had a difficulty in soldering cast iron. Perhaps he was not aware that the soldering-iron should be used red hot, with soft solder and sal ammoniac. Now, providing the surface of the cast iron was filed perfectly bright, and free from grease, he would not have found the slightest difficulty, as cast iron can be soldered by these means with as much facility as the other metals. I, as well as many others, have resorted to this plan, and never once found it to fail. Should you deem this little fact of sufficient importance for insertion, I should feel myself honoured.

I am, Sir, yours, &c.,
A MECHANIC.

Feb. 28, 1854.

SUBMERGED TELEGRAPH-WIRES.

To the Editor of the Mechanics' Magazine.

SIR,—I beg to suggest, through the medium of your Magazine, that the wire of subterranean electric telegraphs be encased in a cable made of hemp and the coir of the cocoa-nut, (a coir-rope floats on water), proportioning the quantity of each, so that the cable be nearly of the same specific gravity as water. Such a cable would be less liable to get cut when lying on sharp rocks.

I am, Sir, yours, &c.,
R. GREENWOOD.

Brick-lane, Bradford.

ON DIPPING AND APPARENT LIGHTS.

BY THOMAS STEVENSON, C.E.

THE author, at a recent meeting of the Royal Scottish Society of Arts, alluded to the great and well-known difficulties and expense, and, in some cases, the impossibility of constructing lighthouses upon sunken rocks. To remedy such difficulties, he proposed two methods, termed dipping and apparent lights, in order to make lighthouses on the shore answer the same ends as if they were placed on the isolated rock at sea.

Mr. Stevenson described the plan of *dipping* lights as being applicable to cases where the rocks or shoals, whose position required to be indicated, were surrounded with sufficient sea-room to enable vessels to pass to and fro without approaching near to the rocks themselves. The dipping light, instead of throwing its beam of parallel rays to the horizon in the same manner as ordinary lights, throws it downward at some given angle of depression to suit the distance of the rocks from the shore, so that whenever a vessel crosses the margin of safety, the dipping light is seen, and she has ample time to change her course.

The *apparent* light is useful for sunk rocks in narrow sounds where the fairway is not broad, and where the dangers must be passed very closely; also for pier-heads at the mouths of artificial harbours, and such like situations. The apparent light at the entrance to Stornaway Bay, in the Hebrides, is erected on a sunk rock distant about 630 feet from the lighthouse on the shore, and consists of a hermetically sealed lantern, containing certain forms of optical apparatus, upon which a beam of light is thrown from the lighthouse ashore. The effect of this apparatus is to reassemble the rays in a focus, from which they again diverge, presenting to vessels entering the

bay the appearance of a real light on the beacon, when in fact there is none. So dangerous was this sunken rock, that many thought the lighthouse should be built upon it, instead of on the shore. By means of the apparent light, however, every end has been gained that could have been secured by the lighthouse, while the great expense of construction and of after-maintenance has been saved. From the very small power which is used at Stornaway (a Holofshotral apparatus of only 20 inches diameter, with a burner 1 inch in diameter) the author concludes that such a plan could be applied to very much greater distances. The optical power at Stornaway could, were it necessary, be increased about a hundredfold, if fitted with a Holofshotral apparatus of the first order. If the electric light were employed in connection with such powerful apparatus, the limits of visibility would of course be still further extended. The apparatus necessary for illuminating floating buoys on the same principle was also explained, and the paper was concluded with extracts from letters from ten different shipmasters, who certified to the utility of the beacon light *in all weathers*. The distances to which it had been seen varied from *one to one and a half* mile,—distances greatly beyond the wants of the locality.—*Civil Engineer and Architect's Journal.*

CHARCOAL RESPIRATORS.

At a recent meeting of the Society of Arts, Dr. Stenhouse described a new application of the absorbent and oxidising properties of charcoal. He proposed to employ a new species of respirator, filled with powdered animal charcoal, to absorb and destroy any miasmata or infectious particles present in the air in the case of fever, and cholera hospitals, and of districts infected by ague, yellow-fever, and similar diseases. He said, "I have got such a respirator, made by Ferguson and Sons, Smithfield, instrument makers to St. Bartholomew's Hospital. It fits closely to the lower portion of the face, extending from the chin to within half an inch of the eyes, and projects about an inch on either side of the mouth. It, therefore, includes the nostrils as well as the mouth. The frame of the respirator is made of thin sheet-copper; but the edges are formed of lead, and are padded and lined with velvet, so that it can be easily made to fit tightly to the face. The powdered charcoal is kept in its place by means of two sheets of fine wire gauze, from a quarter to an eighth of an inch apart. As the body of the apparatus is metallic, it has been electro-plated with silver. Electro-plating the respirator with platinum or gold would certainly be an improvement. There is a small opening closed with a wire gauze screen, by means of which the respirator can be filled with charcoal or emptied at pleasure. The respirator is kept in its place by an elastic band passing round the back part of the head. I have employed *animal*-charcoal, as the more porous substance; but I should think wood-charcoal would answer perfectly well. The object in view is, by filtering the air through such a porous substance as animal-charcoal, to intercept the miasmata which may have got mixed with it. These, I think, cannot fail to be absorbed by the pores of the charcoal, where they will be rapidly oxidated and destroyed by the condensed oxygen, with which they will be brought into the most intimate contact. The probability of this expectation being realised is greatly strengthened by the results of repeated trials with the respirator on certain noxious and offensive gases, such as ammonia, sulphuretted hydrogen, hydrosulphate of ammonia, and chlorine. I have found that air, strongly impregnated with these gases, and which could not be respired for any length of time, under ordinary circumstances, may be breathed with impunity when the charcoal respirator is worn, the odour of these gases being rendered almost if not altogether imperceptible. Any other highly porous substance, such, for instance, as spongy platinum, or pounded pumice-stone, might probably be found to answer perfectly well for filling the respirator; but I have selected charcoal, as the cheapest and most easily available material.

* * * * * *

"In addition to the precaution of wearing such a respirator as that just described, persons necessitated to live in especially pestiferous districts might have their houses made as air-tight as possible, with the exception of such openings as are necessary to maintain a proper amount of ventilation. By means of these openings, the air could be freely admitted through gauze, into which the requisite quantity of charcoal had been quilted. The doors of such houses could also be made double, and be constructed of coarse cloth, likewise containing a thin layer of charcoal-powder. As an additional precaution, if it were thought desirable, the walls, floors, and ceilings of houses in very unhealthy districts could be easily lined with mattresses filled with a couple of inches of charcoal-powder. Were these and similar precautions adopted, I confidently anticipate that Europeans will be enabled to reside with comparative impunity in some of the hitherto most pestilential districts of the world."

MR. HOBBS' LOCKS PICKED.

The opinions we have previously expressed concerning Mr. Hobbs and his achievements, have been fully confirmed during the last few days. His locks have been repeatedly and easily picked by Mr. Goater, a foreman of Mr. Chubb's establishment, and thus the entire effect of Mr. Hobbs' continued efforts to bring English lockmakers and locks into disrepute has recoiled in its full severity upon himself. It is not to be expected that our countrymen will countenance a stranger who has employed himself unweariedly in attempting to divert their confidence and patronage from British manufacturers to himself, without securing the smallest additional advantage to them.

But we have to complain not only of the fact that Mr. Hobbs has been furnishing the public, under guarantees of security, with locks which may readily and easily be picked, but also of the manner in which he has sought to evade the full force of Mr Goater's manipulations.

Our readers will remember that in the Lecture reported in our last Number, after stating the nature of his *tumbler stump* lock, Mr. Hobbs announced his conviction, "that this apparently slight alteration rendered it impossible to open such a lock, except by the mere chance or accident of a key fitting it; there being no possible means of ascertaining the form of key requisite to open it surreptitiously." Between the time of the delivery of that lecture and the discussion on the ensuing Tuesday evening, several members of the Institution of Civil Engineers were informed that Mr. Goater had readily picked several *tumbler stump* locks, and intended to state the fact at the coming discussion. On that occasion, however, Mr. Hobbs rose, and after a few preliminary remarks, most magnanimously stated to the meeting that his locks *might* be picked, and also added a description of the means by which the picking might be effected:

"In the course of manufacturing," he said, "as might be naturally supposed, the weak points of this lock had not escaped detection, and it was soon discovered, that, although the principle was correct, as long as the stump remained moveable, if, by any means, the stump could be held fast, the lock became one of the ordinary tumbler locks, and was as easily picked as the other. For instance, in a till, or drawer lock, where the key-hole was parallel to the bolt, it was easy, by the insertion of a piece of watch-spring, beneath the lock, to catch, and hold the stump, and to open the lock."

This ingenious and cleverly-timed statement of course deprived the disclosure of Mr. Goater's success of much of its interest, although there will be but few persons so obtuse as not to see the full amount of damage really done to Mr. Hobbs' credit.

In consequence of these occurrences, a lengthy correspondence has been published in the daily papers, in which Mr. Hobbs continues most strenuously to ignore the two highly important facts, *first*, that it is his *tumbler stump arrangement* which has been proved so completely insecure; and *second*, that with each of the locks that have been picked he issued the following printed warranty, viz., "The peculiarity of these locks consists in the arrangement of the Tumbler Stump, it being attached to a moveable piece that works under the bolt, thereby preventing the possibility of ascertaining the proper position of the tumblers, *which renders the lock secure against picking*." * In short, Mr. Hobbs, by falling back upon the large and *expensive* lock, attempts to divert public attention from the fact that the principal part of the locks issued by him may be picked in a very few minutes.

It is true that at the discussion before referred to, he stated that the defect of his lock, by which the picking was rendered possible, might readily be removed, "by the insertion of a tongue in the back plate, fitting into a corresponding groove in the back of the bolt, thus cutting off all access to the moveable piece under the bolt; and further, to preclude access to the stump itself, a piece of steel was rivetted into the front plate, reaching through the tumblers into a groove in the bolt, thus placing an effectual barrier between the key-hole and

* The Italics are our own.

the stump. With these slight additions, which were now introduced, locks constructed on the principle of the moveable stump might be considered secure."

This, however, we do not believe. Indeed we are confident that the contrary will before long be proved true.

In conclusion, we add part of Mr. Goater's honest and sensible reply to Mr. Hobbs' representation :

"The question is, did I or did I not fairly pick, last week, four of Hobbs' new American locks, each lock when sold by Mr. Hobbs being accompanied by his printed guarantee that it was 'secure against picking?'

"Mr. Hobbs now intimates that he had for some time known that there were defects in his locks, and that he first announced them. But what are the facts? At the meeting of the 14th inst., when nothing was known of what I was doing, he said in his paper (I quote the official minutes), 'it was impossible to open such a lock.' At the meeting of Tuesday, the 21st, having previously heard that I had picked his locks, he jumped up at the commencement, and stated his conviction that some of his locks (I again quote the official minutes) 'could be easily picked.' The public will form their own judgment on the case.

"An objection is taken by Mr. Hobbs, that I have only operated on one sized lock, and that a small one. To this I reply, the size or shape of the lock makes no difference to me, except that the larger the lock, the easier it is picked, and it can be opened as easily fixed as unfixed.

"Mr. Hobbs says he had some locks at the second meeting, with improvements in them to baffle my operations. After he had explained these, I told him plainly, before all the civil engineers present, that they would not stop me, and I could pick them as readily as I had done the others.

"In conclusion, Mr. Hobbs really has no right to complain of this exposure; he began the war against the English locksmiths in 1851. 'He made a pit, and digged it, and is fallen into the ditch which he made.'"

THE DECIMAL COINAGE.*

EVERYBODY who is in the habit of keeping accounts or making calculations well knows what would be the advantages of having the coinage of the realm, and our weights and measures, arranged according to the decimal scale of notation. Simplicity recommends itself to us in various ways. If we simplify an operation, we make it more easily learnt, more easily taught, more easily performed when learnt, less liable to failure and error, and productive of economy in time. Of course a scale of coins, whose values should form a geometric series, having ten as its common ratio, would be more simple than any other, not in consequence of any *necessary* simplicity residing in the number ten, but because ten happens to be the radix of the scale of notation which we use in our common arithmetic. Our object is to have one scale of notation common to all our arithmetical operations. To alter the decimal scale of our arithmetic is most certainly out of the question. For, although it is perhaps not the most convenient that could have been invented, it has so deep a root in the habits of all the nations of the world, that to change it is not at all desirable. In fact, the superiority of an octenary scale, if such were in use, would be so slight as to be even doubtful.

It would be a difficult matter to determine what number would be the most convenient for the radix of our scale of notation, supposing we had to construct our arithmetic anew. One consideration which would induce us to choose a large radix would be, that we may express large numbers with as few characters as possible. Another would be, that our radix ought to be as composite as possible; that is, be the product of as many small primes as possible, in order that the largest attainable variety of fractions might be expressed in finite terms in our scale. And we should be induced to choose a small radix, that our numeration, addition, multiplication, &c., might be as simple as possible. We are of opinion that the radix *ten* answers these conditions almost as well as any that could be chosen. There is one consideration which would favour the choice of *eight* as a radix; the fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, &c., $\frac{1}{2^n}$, could be

* The Decimal Calculator or Figures simplified; with examples contrasted in each system; and sixteen practical tables of Weights, Measures, and Time, &c., &c. By Robert Mears, accountant.

expressed in an octenary scale by a single significant digit. This certainly would be an advantage, as we shall see when we glance at the new coins which must necessarly be issued when the new system is introduced. But in this scale any fraction not of the form $\frac{m}{2^n}$ could not be expressed in finite terms, whereas in decimals any vulgar fraction of the form $\frac{m}{2^v 5^p}$ can be accurately denoted in a finite number of figures. Perhaps this says very little for or against any system of notation, as there must necessarily be for every such system an infinite variety of fractions inexpressible in a finite number of digits. At any rate, we may say that any arguments raised against our decimal notation (which we use in writing all numbers, whether expressing moneys or anything else) will never be sufficiently important to make a change in *it* at all probable. This being true, the policy of altering our present awkward system of coins for that of decimals cannot be doubted. The facilities which the change will afford for keeping accounts and making calculations, simple or complicated, are set forth in a very unmistakeable way by Mr. Mears in the little publication before referred to. He shows that by the use of the tables for the decimal values of sums of money and of weights, &c., it is less laborious to convert moneys or weights given in ordinary terms into decimals, perform the necessary operations, and then reconvert the result into ordinary coins or measures, than to use the common methods of calculation. This is known to all experienced arithmeticians, and, indeed, many use tables, made by themselves, for the decimal values of parts of feet, pounds, &c., generally because less time and labour is thus consumed, but often because the calculations which they have to make could not be made in any other way. To these persons we need say nothing about the advantages of the new method, for they are best acquainted with them, and most desirous of the change, and of the existing generation, are those likely to be most benefited by it. Future arithmeticians will, however, be the most favoured, for ." pence tables," and " tables of weights and measures," will not exist to puzzle and confuse their youthful wits and waste their valuable time, as has been our unfortunate case. They will be able to acquire something really useful during the time which we have been forced to consume in mastering these matters.

That the change is to take place we look upon as a thing settled. All that has now to be determined is *how* and *when;* as to the time, we say the sooner the better; and as to the manner there need be no real difficulty, the coins actually in use which need be withdrawn being only those of copper, and our threepenny and fourpenny pieces. For, if the sovereign be preserved as a unit, and divided and subdivided into one-tenths, one-hundredths, and one-thousandths, or florins, cents, and mils, the rest of our present currency will form convenient coins in the new system. The half-sovereign will be 5 florins, 50 cents, or 500 mils, and denoted by *£.5*; the crown will be 25 cents, or 250 mils, and be written *£.25*; the half-crown, 125 mils, written £.125 (the last, perhaps, will be the least convenient of the silver coins); the shilling will be 5 cents or 50 mils, and written *£.05*; the sixpence, 25 mils, *£.025*. The most difficult feature of the change lies in the question, what new copper coins ought we to have? If we are to have a coin to each step in our scale, we must have one for the cent. Now the cent, in our present money, would be valued at $2\frac{2}{5}$ pence, which is as much too large for a copper as it is too small for a silver coin. It seems that the five mil-piece must take the place of our present penny; this will $= 1\frac{1}{5}$ pence. The next thing to settle is what coin to have between the mil and the five mil-piece, whether a two or a three mil-piece. This little difficulty arises from the radix of our scale not being capable of a repeated division by *two* without remainder. We have alluded to this before. Perhaps the two mils would be the better coin. This we think would make the mil a much more extensively used coin than our farthing is at present.

There are some inconveniences which would be experienced in the necessary re-arrangement of sums of money now settled in terms of the existing penny. The income-tax, for example, is sevenpence in the pound for all incomes above £150 per annum; this poundage, expressed as nearly as possible in mils, (giving the fraction to the Exchequer of course,) is 30 mils, but this is greater than sevenpence by one-fifth of a penny. This, in an income of £200, would make a difference of 3*s.* 4*d.*; on a thousand a year the difference would be 16*s.* 8*d.* This is no great matter, perhaps. The greater proportionate difference will be made in things at a lower price per article,—as the postage-stamp, or the parliamentary mileage on railways. The penny, if the seller is to have the advantage, must be changed into five mils, which will be an increase of 20 per cent.; so that for travelling 100 miles, or for the purchase of 100 postage-stamps, we should have to pay 10*s.* instead of 8*s.* 4*d.* On the other hand, if the purchaser is to have the benefit of the fraction, the penny will have to be replaced by 4 mils, and the seller will lose 4 per cent. These trifling difficulties we feel assured will soon adjust themselves.

That the introduction of a decimal system of coinage, as well as of weights and measures, is desirable, and about to be achieved, is certainly beyond a doubt. Till it is done, we recommend such of our readers as have calculations to perform, to use Mr. Mear's little book of Tables, for they will render their work the easier. When, however, the change is effected, such tables will no longer be needful, and arithmetical operations in matters of money, &c., will be brought to their maximum simplicity.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Brooman, Richard Archibald, of the firm of Robertson, Brooman and Co., of 166, Fleet-street, London, patent agents. *A method of obtaining impressions from dies and other engraved and figured surfaces by stamping or pressure.* (A communication.) Patent dated August 12, 1853. (No. 1886.)

This invention consists in the interposition of a yielding or plastic substance, capable of becoming softened by the application of heat or moisture, between the object on which the impression is to be produced and the pressing or stamping instrument by which the pressure or stamping action is applied.

Brooman, Richard Archibald, of the firm of Robertson, Brooman, and Co, of 166, Fleet-street, London, patent-agents. *A method of producing castings in malleable iron.* (A communication.) Patent dated August 12, 1853. (No. 1887.)

The metal employed in carrying out this invention may be either scrap, wrought iron, or bars or plates, cut in small pieces. The melting is performed in covered crucibles, with the addition to the metal of about ½ to 1 per cent. by weight of charcoal, or other suitable carbonaceous matter, 1 per cent. of manganese, and 1 per cent. of sal ammoniac. The mixture is kept melted in a suitable furnace for about three hours, and is then cast in chills or other moulds, of the form of railway wheels and various other articles. The castings are subsequently turned or hammered, and forged as required.

Tizard, William Littell, of Aldgate, London, brewers' engineer. *A new combination or new combinations of materials suitable for buildings and other structures and parts thereof, and machinery for producing the same.* Patent dated August 12, 1853. (No. 1888.)

Claims.—1. The construction of panels, doors, &c., by combining strips of metal, woven wire, or perforated metal with boards or sheets of *papier maché*, straw board, or other similar materials. 2. The manufacture of bricks, blocks, mouldings, &c., for building purposes, and of panels, partitions, &c., and of tiles, slabs, or plates for roofing and flooring, by combining plastic mixtures of earthy, animal, and vegetable substances with strips of metal, woven wire, or iron sheets or strips, perforated or otherwise, the said mixtures being applied on one or both sides thereof, as required. 3. Certain machinery for producing the before-mentioned new combinations of materials.

Allan, Thomas, of Adelphi-terrace, Westminster, civil engineer. *Improvements in electric conductors, and in the means of insulating electric conductors.* Patent dated August 12, 1853. (No. 1889.)

The improvements claimed under this patent are—1. The adaptation of iron rods, wires, or strands of wires, or of strands of wires of different metals (insulated or otherwise), for submarine and subterranean telegraphs; and, 2. A mode of insulating several wires at one operation by the employment of compound die-pieces.

Aldred, William, of Manchester, bleacher, Richard Fenton, of Prestwich, waste-dealer, and William Crone, of Salford, fent-dealer, all of Lancaster. *Certain improvements in separating or recovering the wool from cotton and woollen or other similar mixed fabrics, whereby the wool is rendered capable of being again employed.* Patent dated August 12, 1853. (No. 1891.)

Claim.—"The process of separating or recovering the wool from cotton and woollen or other similar mixed fabrics, by the destruction of the vegetable fibre or material by the agency of mineral acid or acids, or by the gas or vapour evolved from such acid or acids."

Picciotto, Daniel Illel, of Crosby-square, London. *Improvements in weaving.* (A communication.) Patent dated August 12, 1853. (No. 1892.)

Claim. — "The employment of electro-magnets to select the thread for producing the pattern, in place of using perforated cards, tappets, and other instruments, as heretofore."

Bartleet, Robert Smith, of Redditch, Worcester. *Improvements in apparatus used in sewing.* Patent dated August 12, 1853. (No. 1894.)

One part of this invention consists in applying an indicator to show the length of stitch that is being made at any required time; and another part of the invention relates to the application of an adjustable gauge to guide the edge of the fabric whilst it is being sewn, in order that the stitches may follow each other in a regular line. The inventor also applies any suitable number of rollers in the bed or table of the machine, to assist the fabric in passing through the machine. He also, in some cases, applies plates of glass in the bed for the same purpose.

Lipscombe, Frederick, of the Strand, Middlesex, water-filter manufacturer. *Improvements in evaporating.* Patent dated August 13, 1853. (No. 1895.)

Claims. — 1. "The generating of vapour from water, spirit, and other liquids, for giving motion to engines, for distilling, refrigerating, and other useful purposes, by causing the heat from lighted fuel to enter one or more air-chambers, containing one or more vessels or tubes having water, spirit, or other liquid in contact with them, the smoke from the lighted fuel being allowed to escape into the open air through one or more flues, having one or more entrances below the level of the entrance to the air chamber or chambers. 2. The generating of vapour from water, spirits, and other liquids, by applying heat to the exterior of the air-chamber or chambers, so as to cause the heat to pass through the material of which they may be composed, before coming in contact with the vapour-generating vessel or vessels in the interior of such air-chamber or chambers. 3. The application and use of one or more gratings placed between the chimney entrance and the chamber entrance, as described.

Boond, John Clegg, of Manchester, warehouseman. *Certain improvements in Jacquard apparatus.* Patent dated August 13, 1853. (No. 1896.)

In Mr. Boond's invention the needles, instead of being pushed forward by springs coiled around them, as is now customary, are acted upon by the back board, for which purpose the following arrangement is made. At each side of the engine, and parallel to the bars, are two rods, the front ends of which are acted upon by the Jacquard prism, while the other ends pass through the back-board, to which they are fixed by nuts. The rods are furnished, at their underside, with notches, into which springs enter when the board is back, and vertical wires, provided with shoulders, pass through holes in the spring, and are jointed above to levers hinged to the frames. The rods are held against the ends of the springs by weights, and by cords which pass over guide pulleys.

Perkins, John, of Manchester, mechanical draughtsman. *Improvements in the manufacture of oils.* Patent dated August 13, 1853. (No. 1897.)

In this invention the coal, coal-shale, or other matters, are put into the first of three retorts, and this first is connected by a cast-iron pipe at one end with the second; the opposite end of which is also connected by a cast-iron pipe with the third. To the opposite end of the third retort is attached the worm or condensing apparatus. When the matters to be operated upon are put in the first retort, the fire is lighted, and the heat gradually brought up to the temperature necessary to effect the decomposition of the coaly matters, at which heat it is kept as long as oily products run from the condensing apparatus or worm pipe.

Peel, George, of Manchester, engineer, and Robert Brownhill, of the same place, manager. *Improvements in air-pump buckets, and in valves for steam engines and other purposes.* Patent dated August 13, 1853. (No. 1898.)

This invention consists,—1. In an improved annular valve for air-pump buckets. 2. In an eccentric valve particularly applicable to the admission and emission of steam, but which may be used for water or other purposes. 3. In an improved compensating valve for steam engines, into which the steam is admitted for the purpose of diminishing the friction on the valve

seatings. 4. In a combination of two valves for regulating the supply of steam in steam engines working expansively. 5. In an improved differential safety-valve, in which a large diameter, with comparatively small weight, is obtained. 6. In a combination of the safety and eccentric valve.

HOSKYNS, CHANDOS WREN, of Wroxhall, Warwick, esquire. *Improvements in the application of steam to cultivation.* Patent dated August 13, 1853. (No. 1899.)

Claim.—"The application of steam power to cultivation by the cutting down or abrasion of the soil on the land side of a trench, by means of a rotatory tilling instrument having a slow progressive motion, as described."

GWYNNE, JOHN, of Essex-wharf, Essex-street, Strand, Middlesex, gentleman. *Improvements in the preparation of black powder from coal, and the application thereof to the manufacture of paints, blacking, and various other purposes.* Patent dated August 13, 1853. (No. 1900.)

After "Gwynne's patent solidified peat or coal" has been carbonised and reduced to powders of different degrees of fineness, the inventor adds to the powders certain portions, as required, of phosphates, sulphate, and carbonate of lime, and sulphate of soda; also alkaline carbonates, sulphate of alumina, sulphate of baryta, or silicious sand.

GWYNNE, JOHN, of Essex-wharf, Essex-street, Strand, Middlesex, gentleman, and JAMES EGLESON ANDERSON GWYNNE, of the same place, engineer. *Improvements in the preparation or manufacture of fuel.* Patent dated August 13, 1853. (No. 1901.)

This invention consists in mechanically combining substances that are bituminous, as tar, pitch, resins, or the compounds of the same that may properly enter into the composition of artificial fuel, with coal, peat, &c., previously prepared for that purpose.

GWYNNE, JOHN, of Essex-wharf, Essex-street, Strand, Middlesex, gentleman, and JAMES EGLESON ANDERSON GWYNNE, of the same place, engineer. *Improvements in the preparation of beet-root for the manufacture of sugar, which improvements are also applicable to the preparation of other vegetables.* Patent dated August 13, 1853. (No. 1902.)

After the necessary external cleansing of the root, the excision of rough and irregular parts, or the removal of the outer surface, by scraping, washing, or other suitable operation, the inventors reduce the whole quantity of the material so prepared into small and uniform pieces, first by the operation of an ordinary rootslicing-machine, and then by taking the slices and cutting them into small equal portions of a size suitable for the subsequent operations.

JOHNSON, JOHN HENRY, of Lincoln's-inn Fields. *Improvements in dyeing or colouring textile fabrics and materials, and in machinery or apparatus connected therewith.* (A communication.) Patent dated August 13, 1853. (No. 1903.)

Claims.—1. A system "of dyeing any textile material either before or after spinning, or when woven into cloth, by the employment of a current of colouring liquid traversing through and penetrating the materials to be dyed, whether this current be produced by means of a lift and force-pump, by steam pressure, centrifugal force, or any other power." 2. A mode of washing and rinsing these same materials, either by separate operations or in conjunction with the dyeing process.

HUGHES, HESKETH, of the firm of Hughes and Denham, of Cottage-place, Middlesex, engineer. *An improved method of producing cut and fancy patterns in velvets, silks, and other textile fabrics.* Patent dated August 13, 1853. (No. 1906.)

This invention consists in employing a blunt edge instead of the sharp-cutting edge usually employed in producing cut and fancy patterns, and in crushing out by great pressure the parts that are to be cut away to produce the pattern. Mr. Hughes employs two rollers, formed by preference of hardened steel, and engraves the desired pattern on one or both of them, leaving upon one of them such parts as are to be embossed, if any, in high relief, and such as are to be cut out in still higher. The rollers are set at the proper distance apart, and by pressure the open parts or spaces of the pattern are, as it were, ground or pulverized out, while an embossed or fancy pattern may at the same time be produced. The rollers must be cleared of the pieces so ground out by a roller or brush.

TALABOT, JOSEPH LEON, of Chaussée d'Antin, Paris, iron master, and JOHN DAVIE MORRIES STIRLING, of the Larches, near Birmingham, Warwick, esquire. *Improvements in the manufacture of cast steel.* Patent dated August 15, 1853. (No. 1907.)

This invention consists in modifying the character of cast steel by mixing oxides of metals and of the earthy bases with "blister steel" when it is melting.

DALGETY, ALEXANDER, of Florence-road, Deptford, Kent. *Improvements in rotatory steam-engines.* Patent dated August 15, 1853. (No. 1908.)

The chief feature of this invention consists in the arrangement and application of one *revolving* and two *sliding* drums or cylinders to the production of rotary motion all on axes.

DERING, GEORGE EDWARD, of Lockleys, Herts. *Improvements in electric telegraphs.* Patent dated August 15, 1853. (No. 1909.)

Claim.—"The use of the element of distance between uninsulated or partially insulated wires or conductors, as a means of insulation for telegraphic purposes, whether such wires be employed merely as conductors or also as generators of electrical currents, and whether or not the conducting power of the earth, or the moisture thereof, or any body of water be employed as one conductor."

DOUGLAS, ARCHIBALD, of Norwich, silk manufacturer. *Improved machinery for stitching, back-stitching, and running.* Patent dated August 15, 1853. (No. 1910.)

The inventor makes use of a needle which is pointed at both ends and is provided with two or more eyes at the middle, through which the thread is passed. It has also a groove made in it, in order to receive the thread and protect it from unnecessary wear while the needle is passing through the fabric, and is held by pairs of fingers or clamps, one pair of which is placed on each side of the fabric, and by suitable mechanical contrivances these fingers or clamps are made to advance and recede alternately, and in so doing to pass the needle through the fabric and cause it to carry the thread with it.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent agents. *A method of and machinery for reducing wood and other vegetable fibres to pulp, applicable to the manufacture of paper, pasteboard, millboard, papier maché, mouldings, and other like purposes.* Patent dated August 16, 1853. (No. 1911.)

Claims. — 1. The reducing of wood and other vegetable fibres to fibrous pulp, by means of mechanical agents acting in the direction of the length or grain of the said fibres and parallel, or nearly so, thereto, together with water or other suitable liquid. 2. A particular arrangement of machinery, consisting principally of a mill-stone or stones, or metal cylinders or rasps with roughened surfaces, which are caused to act upon the wood or other vegetable substance.

STEWART, JAMES, of St. Paul's-road, Camden - square, Middlesex, pianofortemaker. *Improvements in pianofortes.* Patent dated August 16, 1853. (No. 1912.)

This invention relates to improvements in the action of upright pianofortes, and consists in causing the lower end of the sticker to be glued or fixed directly to the fore-end of the lever, which is in two parts hinged together, the back end being hinged to the lever rail, as heretofore.

FINCH, EDWARD, of Bridge Works, Chepstow, engineer, and CHARLES LAMPORT, of Workington, ship-builder. *Improvements in the masts and rigging of ships.* Patent dated August 16, 1853. (No. 1914.)

Claims. — 1. A mode of forming and strengthening ships' masts by introducing vertical T and angle-irons, and of increasing the strength of these again by introducing vertical webs, either attached to the angle or T-irons alone, or attached to these and attached also to each other. 2. The application of an elastic cushion of vulcanized India-rubber, cork, or other elastic matter, as described. 3. The use of a plate at the head of the mast for facilitating its construction, and for supporting the trestletrees and the foot of the top mast. 4. A peculiar mode of shaping the head of the mast for obtaining ease in shipping and unshipping, and for receiving the topmast. 5. A mode of attaching the shrouds so that the strain shall be distributed over a large portion of the mast.

ATHERTON, JOHN, of Preston, machinemaker, and JAMES ABBOTT, of Accrington, cotton-spinner. *Certain improvements in and applicable to machines for winding yarn or thread, called "winding-machines," used in the manufacture of cotton and other fibrous substances.* Patent dated August 16, 1853. (No. 1916.)

Claims.—1. The application to winding-machines of cleaners or clearers. 2. The use of a plate or board placed under the bobbins, and a board or other arrangement for confining the loose fibres and other matters, so that they may not get to the lower parts of the machine. 3. The application of a circular brush or card to the traverser. 4. The use of an iron plate traverser, having holes or slots formed in it.

FOXCROFT, PETER, of Salford, Lancaster, manager. *Certain improvements in machinery or apparatus for doubling cotton and other fibrous materials.* Patent dated August 16, 1853. (No. 1917.)

Claim.—The employment or use of a series of small levers, fingers, or scotches, for the purpose of lifting the top delivering-roller or rollers.

RICHARDSON, GEORGE, of the Eastern Counties Railway, Shoreditch, Middlesex, civil engineer. *Improvements in railway-signals, and in the means of preventing accidents upon railways, and in the apparatus connected therewith.* Patent dated August 16, 1853. (No. 1918.)

This invention relates—1. To the employment of a signalizing instrument, to be acted upon by the flange of the engine-wheel; and, 2. "To causing the setting of a distant signal for indicating danger to put in position an apparatus to be acted upon by other apparatus carried by a locomotive

engine or tender, or both of them, when passing on the rails guarded by such signal set to danger, so that an alarum, as above, shall be given; except when the driver, by having duly regarded such signal, has previously so moved out of the way the apparatus under his control as not to permit its contact with the other apparatus on the line of railway, put forth or exposed by setting of the signal to 'danger.'" 3. To an arrangement of the signals and the gates used therewith, for protecting roads crossing lines of railways.

Hunt, William, of Lee Brook Chemical-works, near Wednesbury, Stafford, manufacturing chemist. *Certain improvements in manufacturing sulphuric acid.* Patent dated August 16, 1853. (No. 1919.)

Claims.—1. Heating the gases in their passage from the furnace to the condenser by means of the waste heat of the furnace, or the waste heat of coke ovens, or other furnaces, so that the said gases may be made to combine with avidity and produce sulphuric acid. 2. The use and application of nitre, sulphuric acid, or any other similar or analogous compound for absorbing and acting upon sulphurous acid. 3. Separating arsenic from sulphuric acid by means of sulphuretted hydrogen, as described.

Newton, Alfred Vincent, of Chancery-lane, Middlesex, mechanical draughtsman. *Improvements in the distillation and purification of resin oil.* (A communication.) Patent dated August 16, 1853. (No. 1920.)

In this invention the distillation is effected in a kettle, of a form resembling the segment of an egg, the separation of the oil from the more volatile products being effected at different points remote from the still, instead of being discharged altogether into a common receptacle as heretofore. When the oil has passed through the coolers it may be purified thus:—At the outlet of the worm of the cooler a wooden trough is to be placed, for the purpose of receiving the condensed oil; this trough is lined with sheet-lead or zinc, and chloride of lime or other cheap chloride is strewn upon the bottom of the trough; the oil, as it issues from the worm, flows slowly over the bed of chloride of lime, which, by taking up the colouring matters and other impurities contained in the oil, effects the bleaching and deodorizing of it.

Heritage, John, of Warwick, builder. *An improvement in the manufacture of bricks, pipes, tiles, coping, and such other articles as are or may be moulded in clay.* Patent dated August 17, 1853. (No. 1921.)

Claim.—The application of a mould, die, or mouth-piece containing water, in front of, and in addition to, the ordinary moulding orifice of machines used for the manufacture of the articles enumerated in the title; the said additional mould, die, or mouth-piece containing water being so applied, that the stream of clay issuing from the moulding orifices of the machines, after being wetted with water, shall be smoothed by passing through it.

Delarbre, Felix Alexandre Victor, of Broad-street-buildings, London, gentleman. *Certain improvements in treating fibrous substances.* Patent dated August 17, 1853. (No. 1923.)

Claims.—1. "The treating of silk, wool, and other fibrous substances by vacuum, by radiated heat, and by chemical or other absorbing agents, to ensure their more rapid desiccation." 2. "The treating of silk, wool, and other fibrous substances by vacuum, by steam, by radiated heat, and by absorbing agents, to produce a permanent dilatation, expansion, and opening of their fibres."

Ogden, Thomas Clark, of Manchester, Lancaster, cotton-spinner, and William Gibson, of the same place, manager. *Improvements in machinery or apparatus for preparing, doubling, and twisting cotton and other fibrous materials.* Patent dated August 17, 1853. (No. 1924.)

Claims.—1. Regulating the distance of the drawing-rollers by means of a rod or bar having diagonal projecting pieces, slots, or inclined planes acting simultaneously the whole length of the machine. 2. Regulating the winding on of the yarn in self-acting turners, by means of a lever and cam or scroll, attached to the common mangle-wheel in "Smith's self-acting headstock" for mules, &c.

Kirkwood, Thomas, of Edinburgh, plumber. *Improvements applicable to ventilation and other purposes.* Patent dated August 17, 1853. (No. 1925.)

Claim.—The forcing of air or other gases into buildings or spaces required to be ventilated or purified, by means of a fan with hollow vanes, made to revolve in water or other liquid, by which the air, or other gas admitted into the vanes, is made to pass out from it, and through a central pipe or hollow axis.

Grimsley, Thomas, of Oxford, sculptor. *Improvements in machinery for the manufacture of bricks, tiles, pipes, and pottery.* Patent dated August 17, 1853. (No. 1926.)

A full description of this invention forms the first article of this Number.

Fuller, George Leedham, of St. Mary's-road, Peckham, Surrey, civil engineer. *Improvements in steam engines.* Patent dated August 17, 1853. (No. 1927.)

Claim.—The expanding into and supplying steam to two or more cylinders, connected in the usual manner with a con-

denser and air-pump, or condensers and air-pumps, from one or more cylinders, supplied direct from the boiler, the supply and exhaust-cylinders being so arranged as to produce together a rotary motion.

MORTIMER, JOSEPH HART, of Chester-place, Old Kent-road, Surrey. *Improvements in lamps.* Patent dated August 17, 1853. (No. 1928.)

Claim. – The application of a small cap or vessel around the burner, within the receptacle for the tallow or fat, and combining therewith a hollow or dished instrument to direct the air to the flame and throw the heat down to the fat below.

CLOUGH, ROBERT, of Liverpool. *Improvements in the construction of ships and other vessels.* Patent dated August 18, 1853. (No. 1929.)

This invention consists in constructing ships or vessels with two bilges, instead of the usual form, by which means depth and stiffness are to be given to the ship or vessel, especially those made of iron; the forms of bilges are to be modified as circumstances occur.

CHALMERS, DAVID, of Manchester, Lancaster, manufacturer. *Improvements in machinery or apparatus for cutting the pile of woven fabrics.* Patent dated August 18, 1853. (No. 1930.)

This invention consists of two rollers or beams revolving in pedestals at each extremity of a frame—one to contain the cloth or material to be cut, and the other to take it up as it is cut or finished. On the top of the frame are fixed two other rollers, nearly in contact, through which the said cloth or material passes, the bottom roller being plain, and the top one forming the knives or cutters; and as the said cloth or material passes between these rollers, it comes in contact with a number of guides to keep the material in a proper position to be acted upon by the knives.

HARKES, DAVID, of Mere, Chester. *Improvements in machinery or apparatus for mowing, reaping, or other similar purposes.* Patent dated August 18, 1853. (No. 1931.)

This invention consists of a circular knife or knives fixed to a drum or cylinder, with the necessary gearing inside it, to give it a horizontal revolving motion as well as a vertical motion, when necessary, to avoid obstructions that may be in the way. The knife or knives may be either toothed or plain at the edges, according to the material to be cut.

COMPLETE SPECIFICATIONS FILED WITH APPLICATIONS.

WENHAM, FRANCIS HERBERT, of Effra Vale Lodge, Brixton, Surrey, engineer. *Improvements in fire-arms.* Application dated February 1, 1854. (No. 252.)

Claims.—1. Securing the breech so that it shall turn with and rotate on a crank, in order to turn it down and force it forwards towards the barrel for the purpose of locking it fast. 2. A method of priming when the nipple is placed in a position in a groove or cavity below the surface of the tail-piece, or stock, so to enable the caps or other priming to be thrust from their containing tube straight forward upon the nipple, by the direct action of a spiral spring; also the releasing of the cap by the deflection of a springing piece which secures the caps in the tube by catching against their edges. 3. The application of a plate or disc in such manner, that when the hammer is down the breech cannot be raised.

MARYON, ROBERT JAMES, of York-road, Lambeth, Surrey. *Certain improvements in machinery for the improved construction of windlasses and other machines for which the same invention is applicable.* Application dated February 6, 1854. (No. 286.)

The chief part of this invention consists in a species of windlass intended to be employed in raising sunken ships or vessels, in a method of applying power to the windlass so as to gain greater speed; in an improved form of barrel to be applied to it; and in an "anti-friction power movement," composed of a set of anti-friction rollers, constructed so as to gear into a common screw. This last arrangement is also applied by the inventor to the steering of ships, and to other similar purposes.

TAGGART, JOHN, of Massachusetts, United States. *An improved machine for excavating earth.* Application dated February 9, 1854. (No. 319.)

The principal feature of this machine consists in the excavating scoops, which are formed of two bowls or cups, respectively attached to the inferior arms of two levers, that cross one another, and turn on a fulcrum or pin, which extends from the prongs of a forked boom.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

WAREHAM, HORATIO, of Fenton, Stafford, potter. *Certain improvements in inlaying or ornamenting earthenware vessels.* Application dated August 12, 1853. (No. 1893.)

This invention consists in employing moulds having raised or embossed patterns, and in filling up the imprints with a plastic material, which is afterwards cleaned off level with the surface.

TIZARD, WILLIAM LITTELL, of Aldgate, London, brewer's engineer. *Improvements in the construction of thermometers, and other like indicators.* Application dated August 12, 1853. (No. 1890.)

This invention consists in attaching iron, glazed copper, or brass bulbs or cylinders to glass tubes; also in imbedding the tubes in India-rubber and other suitable material in metal and wooden cases; and in applying buffers of India-rubber or other elastic material.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex. *Improvements in the manufacture or treatment of gutta percha, and in the application thereof.* (A communication.) Application dated August 13, 1853. (No. 1904.)

This invention consists in combining carburet of hydrogen with gutta percha for the purpose of liquifying it, and in kneading various colouring powders with the same substance in order to harden it.

SCOTT, EDWARD JOHN, of Glasgow, Lanark, North Britain, shoe manufacturer. *Improvements in the manufacture of boots and shoes.* Application dated August 13, 1853. (No. 1905.)

This invention consists in riveting the uppers and soles of boots together with copper or other metal rivets.

RANKIN, BENJAMIN, of College-street, Islington, Middlesex, gentleman. *Improvements in propelling vessels.* Application dated August 16, 1853. (No. 1913.)

This invention consists "in applying the half of a flat disc at an angle across one side of the propeller-shaft in place of the parts of screws and other forms of propellers heretofore employed."

MARTIN, JOSEPH, of Liverpool, Lancaster, merchant. *Improvements in mills for grinding corn and other grain.* Application dated August 16, 1853. (No. 1915.)

This invention consists—1. In driving the under stone while the upper is stationary; and, 2. In the application of a spring, in place of a key, to secure the wheel to the shaft employed for communicating rotary motion to the stone.

PERKES, SAMUEL, civil engineer, of Walbrook, city, London. *Improvements in the construction of cocks and such like articles.* (A communication.) Application dated August 17, 1853. (No. 1922.)

This invention consists in making the valve with a cylindrical stem passing through a hollow one, which is attached rigidly to, or forms part of the body of the cock, and is furnished outside with a screw, to which is fitted a nut, with a yoke, in which the valve-stem is capable of turning freely on its axis, but not of turning longitudinally.

SYMES, WILLIAM, of Pimlico, Middlesex, gentleman. *An improved fruit-cleaning machine.* Application dated August 18, 1853. (No. 1933.)

This machine consists of a rocking-frame, fastened on an oblong shallow box, partially open at top, with a bottom formed of galvanized iron-wires, into which are woven or otherwise fixed rows of spikes, studs, or projections, rising about half an inch to two inches from the bed of wires.

LARMANJAT, JEAN, of Paris, France. *Certain improvements in obtaining motive power.* Application dated August 18, 1853. (No. 1934.)

This invention consists of an electrical apparatus, in which is a key or handle, by which the movement is directed. There is also a button, which, when pressed, acts on a spring carrying at its extremity another button, which fits into one of a pair of openings and effects the necessary connection.

PROVISIONAL PROTECTIONS.

Dated January 7, 1854.

40. Jesse Ross, of Keighley, York, gentleman. Improvements in making compounds of chocolate, cocoa, and other ingredients for breakfast and occasional beverages.

Dated January 23, 1854.

159. Joseph Rowlands, of Ladywood-lane, Birmingham, Warwick, saddler. An improved fastening to be used instead of buttons, buckles, clasps, snaps, hooks and eyes, and other similar fastenings.

170. Peter Armand Lecomte de Fontainemoreau, of Finsbury, London. Improvements in the preparation and combination of fatty and resinous bodies, and vegetable and other wax, for the manufacture of candles, also in the preparation of a wick to be used for the same. A communication.

Dated February 2, 1854.

262. Henry Watson, of High-bridge, Newcastle-on-Tyne. Improvements in the working of brass and copper into forms, and planishing them.

Dated February 3, 1854.

267. Peter Armand Lecomte de Fontainemoreau, of Finsbury, London. Certain improvements in the construction of buildings. A communication.

269. Charles Hastings Collette, of Lincoln's-inn-fields, Middlesex, gentleman. An improved method of reducing ores. A communication.

271. James Rogerson, Samuel Rogerson, and James Rogerson, junior, of Manchester, Lancaster, embossers. Improvements in machinery or apparatus for embossing, cutting, and perforating textile fabrics.

273. William Longmaid and John Longmaid, both of Beaumont-square, Middlesex. Improvements in the manufacture of vegetable charcoal.

275. Pierre Joseph Meeus, of Paris, France, engineer. Improvements in the manufacture of threads from or with gutta percha, and in ornamenting the same.

Dated February 4, 1854.

277. George Mills, of Glasgow, Lanark, Scotland, gentleman. Improvements in the construction of steam vessels, and in steering the same.

279. James Boydell, of Anchor Iron Works, Smethwick, near Birmingham. An improvement in the beds of reverberatory furnaces used for puddling iron.

281. Robert Stirling Newall, of Gateshead, Durham, wire-rope manufacturer. Improvements in setting up ships' rigging.

Dated February 6, 1854.

283. Thomas Sullivan, of Foot's-cray, Kent, roller-manufacturer. Certain improvements in rollers and moulds used in making paper.

285. Benjamin Wrigley Firth, of Oldham, Lancaster, auctioneer and appraiser. Improvements in the method of stopping railway trains, of working breaks on railway and other carriages, and of communicating signals from one part of a railway train to another.

287. Auguste Louis Nicholas Comte Vander Meere, of Paris, France. The manufacture of artificial whalebone, or a substance capable of being employed as a substitute for whalebone and tortoiseshell. A communication.

289. James Balie Graham, of Glasgow, Lanark, North Britain, scientific lecturer. Improvements in the production of printing surfaces.

291. Walter Neilson, of Glasgow, Lanark, North Britain, engineer. Improvements in blowing engines.

Dated February 7, 1854.

293. John Warburton Moseley, of Heathfields, Stafford, doctor of medicine. An improved method of uniting glass and argilaceous cylinders and tubes for conducting water and other fluids.

295. Joh Elce, of Manchester, machine maker. Certain improvements in machinery for spinning cotton and other fibrous materials.

297. Henry Olding, of Lambeth, in the county of Surrey, civil engineer. Improvements in stoves and fire-places.

299. Auguste Edouard Loradoux Bellford, of Holborn, London. Improvements in the manufacture of artificial stone. A communication.

301. Abraham Pope, of Edgware-road, Middlesex. Improvements in machinery for crushing, grinding, amalgamating, and washing quartz or matters containing gold.

303. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in bleaching textile fabrics. A communication from Joseph Lea and Augustus Roth, both of Philadelphia, United States of North America.

305. Barthelemy Urbain Bianchi, of Paris, France, civil engineer. Certain improvements in preventing accidents on railways.

Dated February 8, 1854.

307. George Wigzell Knocker, of Bushy Ruff, Dover, Kent, gentleman. A new method for producing rotatory motive power by means of water.

Dated February 9, 1854

308. John Perry, of Leeds, York, machinist. An improved drilling machine.

309. John Ramsbottom, of Longsight, near Manchester, engineer. An improved hoist for raising and lowering railway rolling stock and other articles.

310. John Dalton, of Hollingworth, Chester, calico printer. Improvements in the construction of bowls or cylinders employed in printing and other processes, and which improvements may also be adapted to other mechanical appliances.

311. Henry Moorhouse, of Denton, Lancaster, tailor. Improvements in part of the machinery or apparatus used in preparing cotton, wool, or other fibrous materials to be spun.

312. Peter Armand Lecomte de Fontainemoreau, of Finsbury, London. Improvements in fire-arms. A communication.

313. François Vouillon, of Prince's-street, Hanover-square, gentleman. A new process of protecting the silvering of looking-glasses. A communication.

314. James Samuel, of Great George-street, Westminster, civil engineer, and Alexander Woodlands Makinson, of New Palace-yard, Westminster, civil engineer. Improvements in drying flax, straw, and other fibrous substances.

315. George Tournay, of Newington-causeway, Surrey, gentleman. Improvements in obtaining motive power.

316. Eugene Boileau, of Holford-place, Clerkenwell, Middlesex, typographical engraver. Improvements in producing raised printing surfaces.

317. Farnham Maxwell Lyte, of Florian Torquay, Devon. Improvements in apparatus for ascertaining the depth of water.

318. Pierre Joseph Meeus, of Paris, France, gentleman. Improved apparatuses for planting grain and seeds, depositing manure, and for performing operations connected therewith. A communication.

Dated February 10, 1854.

320. David Brown, of Smethwick, Stafford, machinist, and John Brown, of West Bromwich, Stafford, roll-turner. An improvement or improvements in the construction and manufacture of axles for railway and other carriages.

321. William Duck and William Wilson, of London-road, Southwark, metal merchants and manufacturers. An internal gas-heating apparatus.

323. Samuel Hunt and Thomas Morris, both of Long Eaton, Derby, builders. Improvements in covering the roofs of buildings with slates, tiles, or other material.

324. Thomas Allcock, of Ratcliffe-on-Trent, Nottingham, agricultural implement manufacturer. Improvements in machinery for cutting straw and other vegetable substances.

325. Benjamin Hornbuckle Hine and Anthony John Mundella, of Nottingham, manufacturers, and Luke Barton, of Hyson-green, Lenton, Nottingham, mechanic. Improvements in the manufacture of knitted fabrics.

326. James Young, of Glasgow, in the county of Lanark, merchant. Improvements in gas-making.

327. Jacques Rives, of Hotel Motay, Rue Motay, Paris. Improvements in railways and railway carriages.

328. Henry Warner, of Loughborough, manufacturer, and Joseph Haywood and William Cross, of the same place, mechanists. Improvements in knitting-machinery.

329. Joseph Johnson, of Manchester, Lancaster, bootmaker. Improvements in apparatus to be used for the preservation of life at sea.

330. Henry Bridges, of Bridgewater, Somerset, carriage superintendent. Improvements in buffers for railway carriages or wagons.

331. James Mitchell, of Dyke Head, Lanark, North Britain, gentleman. Improvements in forcing or distributing liquids.

332. William Whiteley, of Lockwood, near Huddersfield, York, cloth-dresser. Improvements in machinery or apparatus for tentering or stretching woollen and other fabrics.

333. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the manufacture of metallic pens. A communication.

Dated February 11, 1854.

334. Armand Jean Baptiste Louis Marcescheau, civil engineer, of Paris, France. Improvements in locomotive engines. Partly a communication from Charles Baron de Berchtold, of Vienna.

335. Peter Buchan, of Peterhead, North Britain, at present at Drumkewin, Leitrim, Ireland, esq. Improvements in apparatus for measuring and indicating the distances traversed by carriages.

336. Gregory Bird, of Glasgow, Lanark, North Britain, manufacturing chemist. Improvements in the sub-structures or foundations of buildings.

337. John Jennings the younger, of Lorton,

Cumberland, flax-spinner and thread manufacturer. Improvements in brakes for railway and other carriages.

338. John Getty, of Liverpool, Lancaster, shipbuilder. An improved mode of plating iron vessels.

339. John Rogers, manufacturer, of West 21st street, New York, United States of America. The preparation of asphaltum, coal, tar, resin, resin oil, naphtha, and turpentines, for the manufacture of lamp-black.

340. Jacques François Dupont de Bussac, of Upper Charlotte-street, Fitzroy-square, Middlesex. Certain improvements in paving and covering places.

Dated February 13, 1854.

341. George Ayres, of the City-road, London. An improved clip or file, for holding papers or other articles.

342. William Brown, engineer, of Albany-road, Old Kent-road, Surrey. Improvements in printing machinery.

343. Thomas Edwards, of Broad-street, Birmingham, Warwick, leather goods manufacturer. A new or improved fastening for articles of dress.

344. Alexander Chalmers, of Dundee, Scotland, blacksmith. Improvements in mangles.

345. Daniel Campbell, and James Barlow, of Accrington, Lancaster, machinists. Certain improvements in looms.

346. Edmund Clegg, of Rochdale, Lancaster, flannel manufacturer, and Edmund Leach, of the same place, machine-maker. Improvements in slubbing, spinning, drawing, twisting, doubling, and winding wool, cotton, silk, flax, and other fibrous substances.

347. James Cox, of Wenlock-road, Middlesex, engineer and manufacturer of paper-cutting machines. Improvements in knives for cutting paper and other materials.

348. Samuel Russell Brown, of Glasgow, Lanark, North Britain, manufacturer. Improvements in printing textile fabrics, and other surfaces.

349. William Macnab, of Greenock, Renfrew, North Britain, engineer. Improvements in steam engines.

350. John Greenwood, of Irwell Springs, near Bacup, Lancaster, Turkey red dyer. Certain improvements in dyeing textile materials or fabrics.

351. John Burt Smith and Edward Smith, both of Regent-street, Middlesex. Certain improvements in bonnets.

Dated February 14, 1854.

354. William Scaling (of the firm of Messrs. Kitching and Scaling), of Old Basford, Nottingham, basket manufacturers. Improvements in machinery for cutting and ornamenting skeins to be used in the manufacture of baskets and other wicker work.

356. Charles Augustus Holm, of Cecil-street, Strand, Middlesex, civil engineer. Improvements in propelling.

358. Samuel Perkes, of Walbrook, London, civil engineer. Improvements in valve cocks. (A communication.)

360. George Wilson, of Sheffield, York, merchant. An improvement in axle-boxes.

Dated February 15, 1854.

362. John Hossell, of Regent-road, Salford, Lancaster, leather manufacturer. Improvements in machinery or apparatus for washing, scouring, and squeezing leather or other similar substances.

364. William Asbury, of Birmingham, Warwick, engineer. An improvement or improvements in forks for agricultural and other purposes.

366. Octavius Barrett, of Wimpole-street, Middlesex, gentleman. An improvement in the construction of tobacco pipes.

368. John Wren, of Tottenham-court-road, Middlesex, iron bedstead manufacturer. An improved construction of folding chair bedstead.

Dated February 16, 1854.

370. Francis Preston, of Manchester, spindle and flyer maker. Improvements in flyers for machinery for preparing flax, and certain other fibrous materials.

372. John Bush, of Derby, locksmith. Improvements in locks and lock-furniture.

374. Thomas Summerfield, of Birmingham, Warwick, glass manufacturer. The manufacture of chromatic glass and glass-faced bricks, which said bricks are applicable to face work or fronts of buildings, basements, pilasters, string courses, door and window heads, medallions, cornices in part or whole, or other purposes where a superior finish and durability are required, a part of which is also applicable to bricks made wholly of clay.

376. James Pritchard, of Portsea, Hants. Improvements in the construction of screw-propellers and machinery for driving the same.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," February 24th, 1854.)

2198. Charles Alexander. A certain manner of preparing marquetry and all other kinds of inlaid work in veneers of various thicknesses, and for fixing the same to walls and ceilings of whatever kind, and in or upon floors of wood, stone, or metal, and for rendering such floors water and fireproof.

2213. Francis Frederick Clossmann. The production and application of certain materials to be employed in the manufacture of textile fabrics, and for other purposes.

(From the "London Gazette," February 28th, 1854.)

2231. François Julien Raux. Improvements in railway-brakes.

2237. John Henry Johnson. Improvements in apparatus for throwing out ropes or lines for the better preservation of life and property. A communication from M. d'Houdetot, of Havre, France, Receiver-general of Finance.

2329. James Worrall, junior. Certain improvements in the method of dyeing fustians and other textile fabrics, and in the machinery or apparatus connected therewith.

2372. The Honourable Frederick William Cadogan. Improvements in the means of obtaining telegraphic communications applicable to armies in the field.

2373. Auguste Edouard Loradoux Bellford. Improvements in drying grain, flour, timber, fruit, vegetables, and other substances. A communication.

2376. Frederick Samson Thomas. Improvements in the construction of railway carriages.

2384. Alexander M'Dougall. Improvements in the process of obtaining fatty matters from products arising in the manufacture of glue and other gelatinous substances.

2395. John Palmer de la Fons. Improvements in apparatus for measuring and indicating the distance travelled by a carriage.

2409. John Norton. Improvements in fire-arms.

2427. William Melville. Improvements in apparatus for drawing ships out of water. A communication.

2435. Jean François Felix Challeton. Certain

improvements in carbonising and distilling peat, coal, wood, and other animal, vegetable, and mineral substances.

2449. Thomas Stainton. Improvements in steering apparatus.

2472. George Holworthy Palmer. Improvements in the construction of air-furnaces for the fusion of steel and other metals, and for economising fuel.

2498. John Walker Wilkins. Improvements in obtaining power by electro-magnetism.

2578. Edwin Kesterton. Improvements in springs for carriages.

2592. George Frederick Parratt. Improvements in life-rafts.

2595. George Shepherd. Certain improvements in the construction of railways.

2663. George Dugmore and George Haywood Millward. A new or improved method of signalling or communicating between trains on railways.

2761. Auguste Edouard Loradoux Bellford. Certain improvements in straining mill-saws. A communication.

2891. William Frederick Plummer. Improved machinery for grinding or crushing animal, vegetable, and mineral substances.

2900. Benjamin Fullwood. Certain improvements in the manufacture of cement.

2922. Antoine Limousin. Improvements in looms for weaving pile fabrics, and in a mode and apparatus for cutting the pile.

40. Jesse Ross. Improvements in making compounds of chocolate, cocoa, and other ingredients for breakfast and occasional beverages.

88. Arthur Parsey. Improvements in machinery for obtaining and applying motive power by means of compressed air and other fluids.

158. William Darling. Improvements in sewing-machines. A communication.

208. Joseph Atkinson. Improvements in thrashing-machinery.

234. Luther Young Improvements in apparatus for regulating the pressure and supply of gas.

236. Isaac Hazlehurst. Improvements in the manufacture of iron by blast, and in the construction of furnaces and machinery for the same.

269. Charles Hastings Collette. An improved method of reducing ores. A communication.

275. Pierre Joseph Meeus. Improvements in the manufacture of threads from or with gutta percha, and in ornamenting the same.

278. Alfred Vincent Newton. Improvements in springs, applicable to railway-carriages and other uses. A communication.

279. James Boydell. An improvement in the beds of reverberatory furnaces used for puddling iron.

280. William Little. Improvements in distilling or obtaining products from coals and bituminous substances.

291. Walter Neilson. Improvements in blowing-engines.

296. Edward Poitiers. A new material for the manufacture of cordage, canvas, and linen, and generally as a substitute for hemp and flax.

301. Abraham Pope. Improvements in machinery for crushing, grinding, amalgamating, and washing quartz or matters containing gold.

304. Alfred Vincent Newton. Improved machinery for heckling flax and other fibrous materials. A communication.

307. George Wigzell Knocker. A new method for producing rotatory motive power by means of water.

311. Henry Moorhouse. Improvements in part of the machinery or apparatus used in preparing cotton, wool, or other fibrous materials to be spun.

317. Farnham Maxwell Lyte. Improvements in apparatus for ascertaining the depth of water.

318. Pierre Joseph Meeus. Improved apparatuses for planting grain and seeds, depositing manure, and for performing operations connected therewith. A communication.

327. Jacques Rives. Improvements in railways and railway carriages.

332. William Whiteley. Improvements in machinery or apparatus for tentering or stretching woollen and other fabrics.

339. John Rogers. The preparation of asphaltum, coal, tar, resin, resin oil, naphtha, and turpentines, for the manufacture of lamp-black.

345. Daniel Campbell and James Barlow. Certain improvements in looms.

351. John Burt Smith and Edward Smith. Certain improvements in bonnets.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed February 24, 1854.

1971. George Pollard and George Mumby.
1972. Alfred Augustus de Reginald Hely.
1973. Alfred Swonnell.
1979. George Davis.
1981. Richard Archibald Brooman.
2230. Henry Jeremiah Iliffe, James Newman, and Henry Jenkins.
2462. Alfred Vincent Newton.
2518. Richard Restell.
2884. William Thornley.
3036. Richard Waygood.

Sealed February 27, 1854.

1987. William Hargreaves.
2043. John Smalley and Washington Smirk.
2071. Peter Armand Lecomte de Fontainemoreau.
2139. William Nash.
2197. James Leetch.
2241. Caleb Bloomer.
2285. Manuel Fernandez de Castro.
2535. Frederick Albert Gatty.
2719. Benjamin Burleigh.
2758. Georges Edouard Gazagnaire.
2763. Thomas Chambers & John Chambers.
2947. Henry Milward.
2949. Auguste Edouard Loradoux Bellford.
2969. Thomas Vincent Lee.
2997. Frederick Crace Calvert.
3032. Chretien Schönherr.

Sealed February 28, 1854.

2000. Joseph Cundy.
2004. John Henry Johnson.
2010. Joseph Cundy.
2015. Ezra Washington Burrows.
2019. Edward Smith.
2022. William Beckett Johnson.

Sealed March 1, 1854.

2154. Henry Meyer.
2286. Alfred Ely Hargrove and Ralph Richardson.
2500. James Nasmyth.
2710. William Mee.
3012. Duncan M'Nee and Alexander Broadfoot.

1854

54. Antoine Marie Edouard Boyer Elie Ducros and Ossian Verdeau
56. The Rev. William Renwick Bowditch.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

A Subscriber, Carlisle.—Smee's "Elements of Metallurgy" contains descriptions of several galvanic batteries, but the *Second Course* of Lardner's "Hand-book of Natural Philosophy and Astronomy" will afford you much fuller information; it contains an account of *Bunsen's charcoal*, but not, we believe, of *Callan's Maynooth* battery.

J. Farquharson, Sheerness.—Sir William Burnett's English Patent for Preserving Wood, &c., was dated the 26th July, 1838, and prolonged in February, 1852, for seven years, thus it will expire the 26th July, 1859. The Scotch and Irish Patents dated respectively the 25th March and the 23rd May, 1840, have also been recently extended by an Order in Council, dated 18th February, 1854, so as to expire at the same time as the English Patent.

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Mechanics' Magazine.

No. 1596.] SATURDAY, MARCH 11, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

DIRECT-ACTION SCREW ENGINES, DESIGNED AT THE ROYAL NAVAL ENGINEERS' CLUB, PORTSMOUTH.

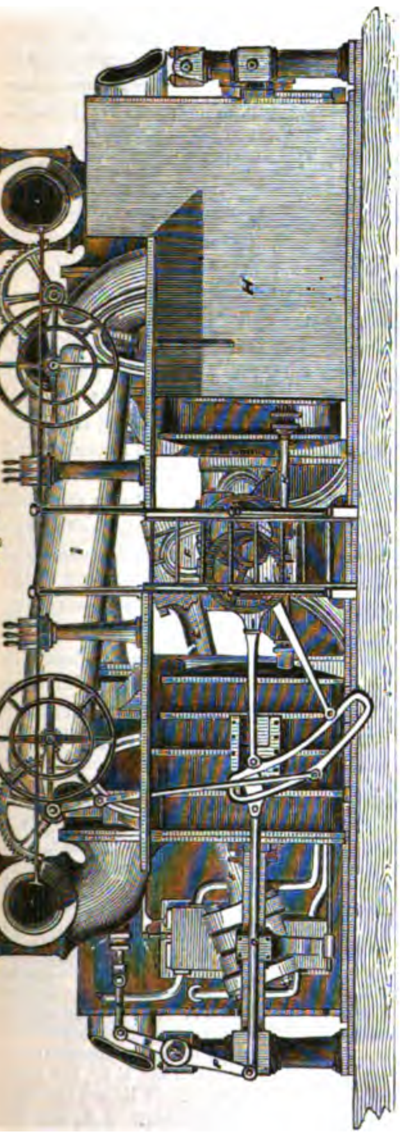


Fig. 2.

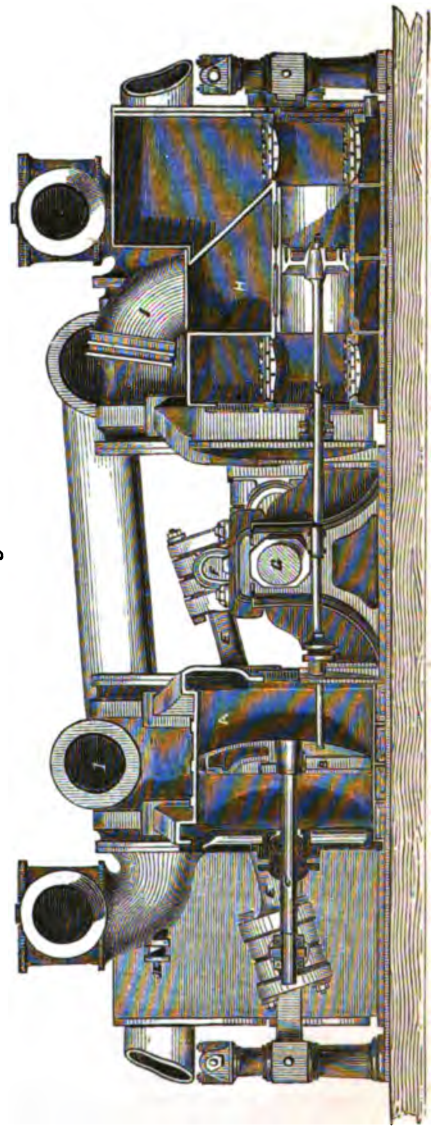


Fig. 3.

DIRECT-ACTION SCREW ENGINES, DESIGNED AT THE ROYAL NAVAL ENGINEERS' CLUB, PORTSMOUTH.

It is gratifying to find that some, at least, of the engineers of the Royal Navy are not behind others of their class, in effecting improvements in screw propulsion, as the present invention sufficiently proves. The designers of the arrangement we are now about to bring before our readers do not lay claim to any great originality, their object being to bring together the best parts of all the known engines of the most eminent manufacturers, and to arrange them so as to obtain connecting rods of greater length than any heretofore employed in such engines, and so as to admit of easy access to, and removal of, any parts that may become deranged, while the space occupied by engines of their construction will not be greater than that ordinarily necessary. The inventors attach particular importance to the increased length of connecting-rod obtained, believing it to be indispensable to the efficient and easy working of the engine, especially for high velocities.

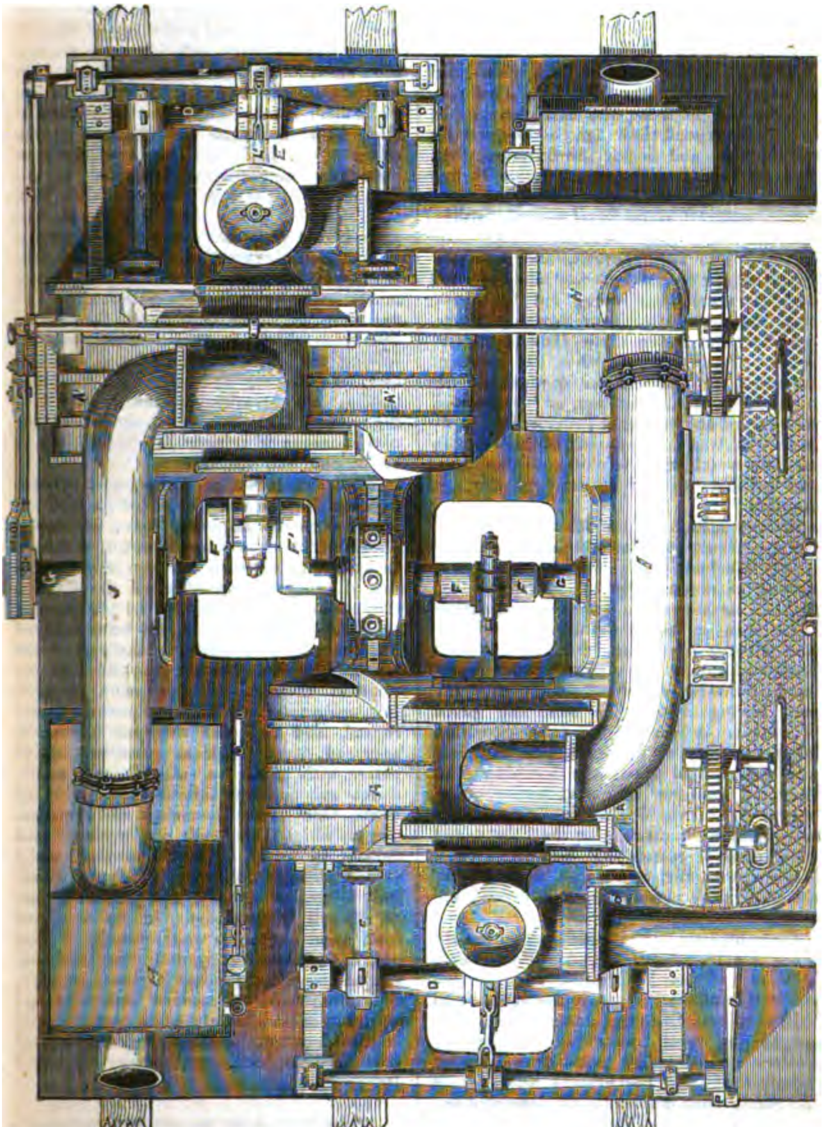
The cylinders are on the principle of Messrs. Maudslay and Field's double-cylinder direct-action engines for paddle-wheel steam ships, but are placed horizontally instead of vertically, and with a different arrangement of the working parts, the cylinders having only sufficient space between them for the introduction of the connecting-rod, the T-cross-heads and lower guides being dispensed with, and the pistons attached directly to cross-heads of the ordinary form. In this manner great strength is combined with simplicity, and means of getting at the cylinder-glands, guides, &c., while under way, as well as at each of the connecting rod bearings, are afforded. The air-pumps are fitted so as to give easy access to the valves, the pump-rods being worked directly from the piston. The slides, of which there is one for each pair of cylinders, are themselves cylindrical, the interior portion forming the induction pipes, the exhaustion taking place from the exteriors of them. By means of the belt round the slide casings, the required area of steam passage is obtained with a reduced travel of the valve, and a communication between the two cylinders is afforded, and thus the pressures on the two pistons are equalized, and the injurious effects that might arise through leakage are prevented. The feed and bilge pumps are placed between the cylinders, and worked directly from the cross-head, and the expansion-valves are fitted to the end of the slide casing, with the slide-valve passing through its nozzle. The slides are worked by the link-motion, and the arrangement of the starting gear is such, that the engineer is in direct communication with the stoke-hole, and thus has the engines and boilers both under his control at the same moment. The surfaces favourable to the radiation of heat, and those exposed to friction, are not greater than the corresponding surfaces in existing engines, but are, on the contrary, less than in many now adopted for screw propulsion.

The simplification of the arrangement of the working parts of screw engines obtained in this arrangement will be peculiarly favourable to the prosecution of examinations and repairs, giving ample room for these, at every part of the engines, and obviating the necessity of making the cylinders single and of very large dimensions, a practice which it is very desirable to avoid, for large cylinders, when priming to a considerable extent, as is frequently the case, occasion great apprehension and anxiety, and at times cause considerable damage, by bending the piston-rods, splitting the cylinder-covers, &c., &c. We need scarcely add, that these engines will be found peculiarly applicable to all large screw vessels, such as our steam ships-of-the-line, and the Eastern Steam Navigation Company's monster ship of 10,000 tons burden.

The accompanying engravings represent a pair of marine-engines arranged according to this invention, fig. 1 being a plan, fig. 2 a transverse elevation, and fig. 3 a transverse section. A A are the steam cylinders on one side of the ship. A^1 A^1 are those on the opposite side. B B B^1 B^1 and C C C^1 C^1 are respectively the corresponding pistons and piston-rods, the latter of which carry the cross-pieces, D D^1. Attached respectively to the centres of these cross-pieces, D D^1, are the ends of the connecting-rods, E E^1, the other ends of which are pinned to the crank-arms, F F^1, on the shaft, G. H H^1 are the condensers, of which the former is connected by the pipe, I, to the cylinders, A A, and the

latter by the pipe, J, to the cylinders, $A^1 A^1$. K K^1 are the air-pump rods, of which K is directly attached to one of the pistons, B B, and K^1 to one of the pistons, $B^1 B^1$. The slide-rods, L L^1, are worked by the arms, M M^1, attached to the axes, N N^1, which have

Fig. 1.



a rocking motion communicated to them from the link motions by means of the rods, O O^1, and the arms, P P^1. The remaining parts of the engines will be readily distinguished, and the arrangement of them understood from the remarks we have already made.

SCREW STEAM-SHIPS OF WAR.

—"those great war-ships, stuff'd with storms that seem
But fit to thunder on the coasts of hell
When devils differ."—MS.

FORTY-SEVEN years ago, a multitude assembled at the port of New York, indulging largely in expressions of jovial ridicule at the expense of those who had been simple enough to expend their time and capital in constructing and fitting the *Clermont*, that then lay lashed to the wharf beside them; but as the hawsers were cast off, and the *first commercial steam-vessel* moved briskly away from the quay, contempt was swiftly changed into astonishment, and the genius that produced her was admired, not by that assemblage alone, but by others also that, hour after hour, rushed, as she passed, to the shores of the Hudson to witness so great a marvel; while the crews of the vessels that sighted her by night shrank from the terrible apparition, or "prostrated themselves, and besought Providence to protect them from the approach of the horrible monster which was marching on the tides, and lighting its path by the fires which it vomited."

On the morning of the 9th of June, 1815, the appearance of a steam-vessel in Portsmouth Harbour was a circumstance occasioning so much surprise and excitement, that the members of a court-martial sitting at the time, on board the *Gladiator* frigate, rose without hesitation, and at once proceeded to inspect the singular visitor; and on the following day the Commander of the port, having ordered his band and guard of marines on board of her, followed with a large company of admirals, post-captains, and ladies, and spent the morning "in steaming amongst the fleet, and running over to the Isle of Wight," while spectators assembled by thousands on the shores, and the number of vessels that crowded around was so great, that it became necessary for the admiral to appoint a guard to preserve order.

On contrasting the preceding scenes with the spectacles now presented in Portsmouth harbour and the Bosphorus, we are constrained to admire not only the genius and skill that have made the attainment of such magnificent results possible, but also the wisdom and sagacity that our successive Admiralties, and the present Surveyor of the Navy, have displayed, in promptly applying the principal improvements made by our mechanics to the fleets on which our national honour and security so largely depend.

In expressing this admiration, we do not at all desire to conceal the errors and shortcomings which have, at various times, been justly ascribed to our naval administrators. We are quite willing to allow, that had the service never been regarded less than individuals, and had science never been sacrificed to ignorance and prejudice, we should, in many cases, have had fast where we now have slow, buoyant where we now have deep, and healthy where we now have sickly ships, while such savings might have been effected that, with the same revenue, either the artisans who built our vessels might have been more equitably remunerated, or the Exchequer might have been far richer than it is. But we prefer, at this time, to lose sight of defaults that are rather incidental to all, than characteristic of particular administrations, and, instead of deploring minor evils, to look with satisfaction and gratitude to those large and formidable squadrons which, at this moment, are inspiring our allies with confidence and our foes with terror, and are also inclining neutral and wavering powers to side with the nations that have so wisely turned the developments of science to the defence of civilization and freedom.

With the causes of the present dispute between Russia and the allied powers we, in our scientific capacity, have, of course, nothing to do. It is not a part of our duty to speculate whether his own ungoverned lust of conquest has impelled the Czar to the measures that have led to the present hostilities, or whether he has been decoyed into them by vacillation on the part of the British Cabinet. We are thankful that our vocation exempts us from such matters. But, seeing that our national peace *is* interrupted, and that our national honour *is* menaced, it may well be permitted us to notice with pride the strength and confidence our country derives in the present crisis, from those inventions and improvements, which it is both our business and delight to foster. And if ever there was a period when patriots owed a debt of gratitude to men of science, the present is one, as all will acknowledge; for no man can look upon our ports and arsenals at this moment without feeling that, notwithstanding the progress of other nations, we may, in consequence of modern scientific appliances, still repose the same confidence as of old in our mighty fleets, and that it may now more emphatically than ever be said of Britannia, that,

"Her march is o'er the mountain wave."

But it should not be forgotten that the operations of the war in which we are now engaging will be mainly unprecedented in

consequence of the change of circumstances occasioned by the general introduction of steam-power into our fleets. Future wars will differ as much from those of the last, and the early part of the present century, as those which succeeded the invention of gunpowder differed from others which preceded that event. This change is already apparent in the fact that the vessels intended for service in the Baltic have not ere this left our coasts, and, indeed, are scarcely yet assembled, although the period at which the spring will liberate the Russian Western Squadron is approaching so nearly. But this delay, which might prove so ruinous were our navigation dependent upon winds and currents, can bring no evil, since we have an armada which, defiant of tides and storms, will shape its course across to the Kattegat in the appointed time. A similar observation applies to the circumstances of our fleet in the East. We need not complain that our flags are still waving above the Bosphorus when our vessels carry with them a power which can swiftly and easily bear them from end to end of the Euxine, and which, if our admirals so appoint, can as swiftly and easily bring them side by side with the enemy, beneath the batteries of Sebastopol. But these examples are very insignificant when compared with the events that will, in all probability, occur during the coming struggle. The old systems of warfare are for ever swept away. The famous manœuvres of naval actions—the favourite tactics of all the commanders that have signalized themselves in maritime wars, are set aside, and new arts and methods, suited to the present navies, will have to be adopted. These considerations naturally lead to the reflection that we must also look for officers adapted to these changed circumstances. The captains of the coming wars must be guided, not by the manner in which Nelson fought the Nile, nor by any other model, but by the exercise of their own unaided talents, and the inspiration of their own genius in unprecedented exigencies.

The facility of motion afforded by steam power, would of course, however applied, be of the highest importance in convoying, chasing, retreating, raising blockades, and intercepting the enemy. But with screw-vessels every advantage is obtained without any corresponding detriment. The armaments carried by our ships of the line fitted with screws are not only unimpaired, but in consequence of the increased manœuvring power possessed by them, the destructive capabilities of their artillery are enormously increased. Indeed, it is difficult to conceive it possible for a vessel that is without auxiliary steam power to contend for long with one of equal size similarly armed and possessing it. In such cases the contest will, in all probability, be peculiarly brief and bloody.

It is very certain, however, that, to a great extent, we are about to enter upon elaborate and, perhaps, disastrous experiments. It must not be concealed, that the first sea-fight that occurs may possibly demonstrate the fearful vulnerability of our screw steam-ships. May it not be that when the smoke of the enemy's first broadsides shall roll away, more than one of our boasted bulwarks — our *Agamemnons*, our *Majestics*, and our *Cæsars*—shall be seen lying with shattered sternposts, rudderless, and at the mercy of the foe? Of course every possible precaution has been taken to avoid such a catastrophe, and in most of our screw-ships of the line the after sternpost is but little more exposed than the stern-posts of ordinary vessels; but this is by no means the case with many of our smaller ships, the safety of which, we believe, will altogether depend upon the frustration of the aim of the enemy, which may always be effected by a few revolutions of the propeller.

Nor can we assure ourselves that machinery, which has often proved so capriciously fragile between the Nore and the Mouse, or at the measured mile in Stokes' Bay, will not fail us either in the heat of action, or the hurry of retreat. Nothing is more common than such failures; and yet nothing can be done that will certainly prevent them. Let any one reflect upon the numerous parts which are brought together in a steam-engine, all of which are essential to its operation, and many of which are subject to varying actions, and he will at once cease to think it possible altogether to avoid mishaps, even with the greatest care and the most judicious precautions. It is well, then, not to lose sight of the fact that our future success, in some measure, depends upon fortuitous events, and not alone upon the undiminished bravery of our seamen.

There are many persons, we may add, to whom steam ships of the line are great marvels; and to the uninitiated, it must appear extraordinary that such vessels should have received into them, since the last war, the considerable items of 500 or 600 horse-power boilers and engines, and should at the same time accommodate as many hundreds of tons of coals as are necessary to keep these in operation for a long period; and this, too, at a time when the weights of their armaments have considerably increased. The fact is, that the means of effecting this have been provided in two ways; first, by increasing the dimensions of

the vessels (chiefly by lengthening),* and, secondly, by reducing the quantities of provisions and stores with which they are supplied, and which are not now required to be so great as when voyages were much longer than at present, being performed without the aid of steam, and before other valuable improvements, now employed, were introduced.† Thus, by a species of compensation, the introduction of the great weights before alluded to has been made possible, and all the advantages of that introduction secured.

The mercantile uses of large screw-ships have been already sufficiently established; their service in warfare will, probably, be shortly tested. As before intimated, we have the satisfaction of believing that if they are to make war more destructive, they will also make it more brief, and thus close its calamities the sooner. Meanwhile, it is a pleasing reflection for us to indulge, that, however terrible England's instruments of war may be, they will never henceforth be employed, save in the defence of herself or of the oppressed.

ROYAL SOCIETY—THE MORALITY OF ITS MEMBERS.

[In this Magazine for January 10th, 17th, and 24th, 1852, was published a review of Mr. Babbage's work entitled "Views of the Industry, the Science, and the Government of England."

An opinion of the Reviewer, it will be remembered, induced Sir James South to address to us a letter which was inserted in the number for January 24th, at the end of the review. The allegations contained in Sir James South's letter were made the subject of a discussion at the last anniversary meeting of the Royal Society, and we feel bound, considering the grave character of the charges in question, and the eminence of many of the parties concerned, to place before our readers the following report, which we have good grounds for believing to be a substantially correct statement of what then transpired. We shall at present abstain from offering any further remarks upon this serious matter.]

At the last anniversary of the Royal Society, after the President's speech, and before the ballot for the officers of the Society commenced:

Mr. Babbage said:—My Lord, as I observe that the Rev. Richard Sheepshanks, one of the Fellows of the Royal Society, is present, I wish to put a question to him, the answer to which is of the greatest importance to the credit and honour of the Royal Society.

In the *Mechanics' Magazine* of the 24th January, 1852, there is a letter written and signed by Sir James South, F.R.S., and headed by an extract from the previous number, in which a severe censure was passed by the reviewer upon the conduct of the Rev. Richard Sheepshanks; the criticism is as follows:

"If this be not subornation of perjury, it is very like it."

Here the Astronomer Royal got up, and interrupting Mr. Babbage, began by saying that "his object was to prevent any question from being put to his friend Mr. Sheepshanks." The meeting, however, interrupted the Astronomer Royal by repeated cries of "Chair," "Chair," which at length compelled him to sit down.

Mr. Babbage then read the following extract from the printed letter of Sir James South:

"Sir,—The perusal of the able article in your Journal, from which the above extract is taken, has called to my mind a parallel instance of quasi-subornation of perjury, which you may perhaps deem not unworthy a corner in your pages, illustrating, as it does, very strongly how British workmen are but too often injured in their reputation by foreign counterfeits, and how the practice derives encouragement from the low state of moral feeling prevailing as well among scientific (or rather pseudo-scientific) as among fashionable circles."

This sentence was read amidst considerable interruption, Mr. Sheepshanks' friends wishing to save him from further exposure. When the clamour slightly ceased, the Lord

* The great ratio of the length to the breadth in many screw-ships is notorious. Perhaps the *Miranda*, a steam sloop attached to the Baltic fleet, affords one of the most striking illustrations. In her this ratio is so great, as to be very detrimental, not because of her great length, but in consequence of her small breadth, which will scarcely, if at all, admit of her guns being fought in the usual manner.

† Grant's apparatus for distilling salt water has had the effect of diminishing the quantity of water carried by a ship of the line from about 600 to 80 tons.

Chief Baron rose to inquire whether Mr. Sheepshanks had had notice of this attack. Mr. Sheepshanks said that in point of form, he had not had notice; but that he knew very well that it was intended, and that he waived all questions of notice.

Remarks were then made by other speakers, most of which were difficult to catch in the midst of the cries and confusion which the efforts of the noble President were unable to allay. The excitement of the meeting was intense, when, high above all other noises, the voice of the Rev. Richard Sheepshanks himself was heard, declaring that after what had already been said, it was impossible and unfair to stop the question. —"You can't stop it," said Mr. Sheepshanks,—"I insist on being heard,—I will be heard." Hereupon Mr. Cotton, the Bank Director, rose on a point of order, and addressing the President, remarked that it was impossible for any business to be transacted if one individual member assumed a right to resist the will of the meeting as expressed by the Chairman. On this Mr. Sheepshanks apologized for the words in which he had too hastily expressed his wishes, and still urged that it was now too late to stop his defence.

Mr. Babbage then continuing, said the letter went on to state, that Sir J. South, calling one day on his friend Mr. Troughton, found him in a state of great agitation, and asking him the cause, Mr. Troughton said, "That fellow, Dick ——" (Sheepshanks) "has just left; he has been abroad, and has brought from Paris one of Jecker's circles; he tells me 'that to avoid payment of duty for it, he has had the name of *Troughton* engraved on it,' and he has asked me 'to let one of my workmen go down to the Custom-house, and clear it for him as an English instrument.' I told him I would rather cut off my right hand than be concerned in such a rascally transaction." * * * Mr. Troughton then said, "I told the fellow, if he wanted to rob the Revenue by perjury, he must get some other person to help him; and he went away in great dudgeon." Sir J. South's letter further went on to state, "that calling on his old friend Troughton a few days after, he introduced me, with a look of contempt which I shall never forget, to a *circle* which was lying there; he put it into my hands, saying, 'It was *the* Jecker's Circle, which S'(heepshanks) 'had got from the Custom-house, but whether by swearing to a lie himself, or by having gotten some one to swear to a lie for him, he did not know.' He pointed to the name of 'Troughton' engraved on it, said, 'The imitation was a very good one, and the fellow was an expert forger.'"

It appears from this publication that the Rev. Richard Sheepshanks stands charged by one of the fellows of the Royal Society with

1. Having caused the name of Troughton to be forged upon a foreign instrument, in order to pass it through the Custom-house as an English instrument.

2. That Mr. Sheepshanks committed this forgery for the purpose of defrauding the revenue.

3. That Mr. Sheepshanks applied to Mr. Troughton to allow him to suborn one of his workmen to perjure himself by swearing that the French instrument was made by Troughton.

4. That, failing in this, Mr. Sheepshanks either succeeded in getting some other person to swear to that falsehood, or did it himself.

All comment on such conduct, when pursued by a Fellow of the Royal Society, and a clergyman, is superfluous. The question I wish to put, through the President, to the Rev. Richard Sheepshanks, is simply this:

Is any one of those charges true?

The President then stated that he had previously consulted the Council upon the case, and that, after due consideration, they recommended that he should not put any questions to Mr. Sheepshanks on the subject.

The Rev. R. Sheepshanks then rose to defend himself against the statement contained in Sir James South's letter. As he has long ago promised to print his defence, which he will probably publish shortly, it is sufficient to state the substance of a speech which was frequently interrupted by marks of dissent, and sometimes of disgust, and which, throughout its tedious length, was unsupported by one single cheer of sympathy—ironical cheers were not unfrequent.

Mr. Sheepshanks admitted the truth of the first two charges. He even proceeded so far as to adduce arguments in their justification, relying principally on the fact, that he had been for several years a *law student*.

With respect to the third and fourth charges, he denied them, and argued upon their improbability from the fact of subsequent continued intimacy with Troughton.

He declared that the conversations with Troughton were mere falsehoods of Sir James South's; and he assured the meeting that they were, in fact, "*all bosh.*" Mr. Sheepshanks also denied that he himself had *personally* smuggled the instrument through the Custom-house, or that he had made either an oath or a declaration that it was of English manufacture. His account of the affair was, that he requested a friend, who was paying a visit to Paris, to procure for him a Borda's reflecting circle from Jecker; that he further directed Troughton's name to be engraved on the circle, in order that the instrument might enter free of duty (which he considered unjust and exorbitant), and without giving any trouble to the gentleman who took charge of it. That the instrument was accordingly introduced without payment of duty, and was left by his friend at Mr. Troughton's shop. He justified this conduct by stating that "the revenue had often cheated him, and he had cheated the revenue," but that, upon the whole, he was a loser by these transactions.

Mr. Sheepshanks, however, did not produce that friend who had assisted him in this affair; but it appears that Mr. Troughton was fully aware of the aid he received by the following remark addressed by him to Sir James South: —"and from what he" [Mr. Sheepshanks] "said, I am not sure if W...... is not as deep in the mud as Dick is in the mire."

The meeting, which had at the commencement been all attention to Mr. Sheepshank's defence, now became very impatient as the reverend speaker got deeper and deeper in the mire. At last, to save him from further exposure, his friend Col. Sabine interrupted the thread of his discourse, and, amidst much noise, moved "the previous question." Mr. Sheepshanks himself strongly objected to be thus abruptly stopped in his defence. Those who had brought forward the subject were strong in their endeavours to procure for Mr. Sheepshanks a full hearing, and they were supported by others who expressed their sense of the injustice with which he was treated by his own friends. The previous question was, however, at length put by the President, and carried by a majority.

UNIFORM MEASURES, WEIGHTS, AND COINS.

At a recent meeting of the Institution of Civil Engineers, Mr. James Yates, M.A., F.R.S., &c., read a paper "On the means of attaining to uniformity in European Measures, Weights, and Coins."

Believing that the only way of attaining the object in view, was by the adoption of the French system of measures, weights, and coins, and that such a step would be attended by great advantages in regard to exactness and convenience, as well as uniformity, the author first gave a brief account of the origin and principles of that system. The method of determination of the "mètre," as the standard of linear measure, and the representation of it by the bar of platinum, deposited in the National Archives at Paris, was narrated. A description was then given of the mode of deducing from that standard all other measures of length, of superficies, of solidity, and of capacity; as also of the determination of the fundamental weight, called the "gramme," and the derivation therefrom of the "franc," containing five grammes of standard silver, and forming the basis of the ascending and descending series of coins, and monies. The advantages of the decimal divisions and multiples, and of the names applied systematically to all, were asserted, notwithstanding the partial recommendations of the octonal, and still more, of the duodenal methods of computation.

Adverting to the successive obstructions and difficulties which the system had to encounter from political disturbances, as well as from popular prejudice and the previous habits of the French nation, the author mentioned its final establishment, during the reign of Louis Philippe, and its gradual extension and steady progress subsequently to that period, both in France and in many other of the Continental kingdoms. As practical examples, specimens

were exhibited, showing some of the forms in which the French measures were now sold and applied to all the purposes of common life.

Considering the success which had attended this grand project of social improvement,—the generous and enlightened spirit in which it was conceived,—the difficulties which it had surmounted,—the successive amendments which it had received, as the result of experience, during the course of more than half a century,—the exactness of its principles, and the beauty of its adjustments,—and the almost universal approval accorded to it by the millions of persons who now employed it in their daily intercourse and occupations, it was considered manifestly impossible that it should ever be abandoned for any other system wherever it had once been adopted. If this were true, it followed that the French system must remain, whatever other systems might be discarded, and it might consequently become universal. It was therefore argued, that it would be wise to take advantage of the progress towards uniformity thus made, and to use all means for extending the influence of that system.

As the French had not hesitated to adopt British inventions when the advantages were made apparent, it was argued, this country should be equally willing to adopt any amelioration, from whatever source it might be derived. No nation was better qualified than the French to introduce improvements in the theory and practice of metrology. If they had not already offered an admirable system to the world, all civilized nations would look to them as, perhaps, the most able to invent such a system, on account of their acknowledged attainments both in theoretical and mathematical science, and their dexterity in certain branches of mechanics. No narrow prejudice or national antipathy should prevent an international combination for the promotion of a scheme fraught with advantage to the interests of commerce, of science, and of philanthropy.

In addition to the objections urged by theorists, there were others, equally formidable, arising from habit and popular prejudice. These, it was contended, must be overcome by the combined efforts of the Government and the people. The Government had under its control infinitely the greatest amount of measuring and weighing and counting of money in the kingdom, and, consequently, had the greatest interest in introducing a system which would be attended, in addition to numerous and far greater benefits, with a saving of a very large amount, probably a quarter of a million annually, in the collection and management of the revenue. But the Government could not possibly effect this great change apart from the people; therefore the people should co-operate with, even if they did not commence the work; and it was a question whether it was not best that the change should begin at the bottom of the scale. The French system was so simple and beautiful, that it could be taught in a week to the children of all schools for the poor throughout the kingdom, and they would take a pleasure in diffusing the knowledge of it among their parents and elders. Decimal methods of computation, and the ability to use the French measures, weights, and coins, having been propagated among the poor, would necessarily be well known to the rich, and would thus soon become familiar and habitual among all classes of the people.

The objection made to the use of French terms, such as *franc, centime, mètre,* &c., was refuted on various grounds. These terms were not in fact French, but rather Greek and Latin; and they were, on that account, at first to some extent repudiated by the French. On the other hand, Avoirdupois and Troy (*Troyes*) weight being French, the English were now only asked to exchange old and inconvenient French weights for new ones, which were better. But the introduction of numerous terms, with other fashions and usages from France, and their constant recurrence, showed that this objection was much overrated. Even if it were a valid objection in point of fact, it was one of little moment; for if the terminology was objected to, the system might be taken without it. The Piedmontese, for example, used the French monetary system, although they called a franc a "*lira.*" As the Arabic numerals, which were used wherever computation by tens was pactised, were the signs of numbers, which were called by different names in different countries, and yet were everywhere received in the same sense, so the same measures, weight, and coins might be known, in the various parts of the world, under different denominations, and yet be perfectly understood and employed, by common agreement, throughout the earth.

The author exhibited a scheme of coinage, having the franc for its unit, the scale ascending to one hundred francs in the one direction, and descending to the one hundredth part of a franc, called a "centime" or "cent." (*pars centesima*), in the other direction. He maintained that the franc, occupying a middle place between the highest and the lowest coins, and being of that value which was either on a par with the great majority of purchases and payments in this country, or certainly not at

all below them, was well fitted to be taken as the middle term, and, in this respect, was preferable to the pound sterling, or even to the dollar. At the same time, nothing could be better adapted to secure facility, promptitude, and correctness in keeping accounts, than the reckoning by francs and centimes. He thought it useful to have a gold coin of one hundred francs, and a centime (perhaps of brass, on account of its large dimensions), in order to exhibit both extremities of the series to the eye, and to make that series complete. He considered the rare occurrence of these smaller coins to be no objection, but the contrary; because it would show, that the middle term was fixed where it ought to be,—at that point where coins were in most constant requisition, for the purposes of trade and daily intercourse.

Remarks were offered, showing the application of the subject to the employments of shopkeepers and retail traders, merchants and bankers, stock and sharebrokers, and more especially to railway companies; as also its almost indispensable necessity with a view to international postage.

In conclusion, it was suggested that all persons who were interested in this question, either on commercial grounds, from the love of science, or as the friends of peace and human progress, should use every means of co-operating with the Government, and either by forming associations, or otherwise, endeavour, in every possible manner, to induce the mass of the people to become acquainted with the principles and advantages of the French system, and thus, with all convenient speed, to introduce the knowledge and use of it, not only in Great Britain and Ireland, but in all the colonies and dependencies of the kingdom, and, through the influence of example, eventually to extend it to the United States of America, and other independent countries.

LIPSCOMBE'S IMPROVEMENTS IN SHIP-BUILDING.

To the Editor of the Mechanics' Magazine.

Sir,—Your correspondent "N. B.," of Sheerness, the self-appointed critic of my tract, introduces the subject of my improvements in ship-building in a tone of ridicule, thus, "Allow me to call the attention of your readers to another grand improvement in ship-building;" and in a lengthy letter tries to ridicule my tract descriptive of those improvements. Listen to some of the absurdities of this sapient critic; he suggested that a vessel upon my plan would go faster stern first than bow foremost—a suggestion that has caused many a grin among those to whom it has been related, and who have seen the model of my trial boat. He denied my statement that a flat underneath shape was the form of greatest stability, assuring me that the submerged portion of the hull of a ship may be round, hollow, or irregular, with equal advantage. Then he was quite unaware, or had forgotten, when writing his first letter, that natural stability could be given to a ship by giving her a proper shape and width without reference to the artificial stability obtained by ballast, and furthermore told your readers that I made quite a mistake in supposing the deeper the ship, the more she tends to be driven out of her course by side currents; and denied altogether the accuracy of my experiments relating to the resistance met with by wedges and incline planes when moving through water. I stated that, if we simply doubled the length of an incline plane, we reduce the resistance of water to its motion one half. He gave your readers his calculations to prove that I was completely wrong. To this singular criticism, singular from the astounding ignorance displayed by the critic, I replied, proving him to be wrong in every one of his statements. He afterwards forwarded for insertion in your Magazine, a second letter, acknowledging that he had committed what he calls "a very stupid blunder" in his calculations, and pretends it was caused by endeavouring to give a popular explanation of the law of resistances. Nothing daunted, he, like an old hand at miscalculation, gives us other calculations, which he affirms are right, but which are equally wrong.

Although in his critique, he suggests that a vessel formed on my plan would go faster stern first than bow foremost, yet my reply so altered his singular ideas in this respect, that in his second letter he says, "As a steamer she will probably be a very fast vessel;" and by way of a set-off to this admission, or perhaps having a natural tendency to blunder, he predicts that as a sailing vessel she will be an utter failure, unless I give her the same amount of lateral resistance as ordinary ships. Hereafter, in this paper, I will show this prediction to be just as erroneous as all his other statements.

In my tract, and in my reply to "N. B.'s" critique, I stated that the hydraulic law relating to the motion of wedges and incline planes on water was in proportion as the length of a wedge exceeds its greatest width, but somewhat differently as regards an incline plane, as the resistance of water to its motion is lessened in proportion as its length exceeds its greatest depth; and that

if we double the length of an incline plane without altering its width or depth, we thereby lessen the resistance of water to its motion one half. I have discovered by experiments this law, and I will now clearly prove my view of it to be correct.

If we place a flat very thin board, A (fig. 1), horizontally in a current, the pressure of the current against it will be so little, that for the present we will consider it to be nothing. If we place another, B, vertically, the whole pressure of the current against it—say of 8,000 lbs.—will tend to drive it horizontally backward. Now, let us fasten to them the board C, which has an angle of 45°, that is exactly midway

Fig. 1.

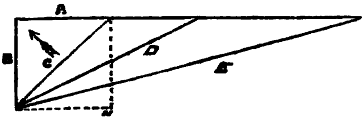


Fig. 2.

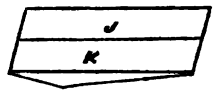
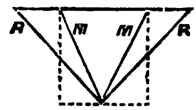


Fig. 3.



between the horizontal direction of A and the vertical position of B, and let the current run against the incline board, C, the current pressure of 8,000 lbs. will be precisely the same against it as against B; for although the incline C contains a greater superficial area than B, yet the direction of the current being horizontal, its pressure against C is precisely the same as it would exert against B, supposing C were not before it.

I particularly wish to caution your readers not to confound the natural pressure of the water against A B C, when submerged, and when both it and the water are motionless, with the extra, or as I have called it, the current pressure the water exerts when in motion. This current pressure is only exerted in the direction the water is moving. When it is moving in a horizontal direction, it exerts no current pressure upwards, downwards, or sideways, unless an obstacle is in its way. Its amount of pressure is then precisely in proportion to its velocity, and to the vertical area that obstacle presents to the current, without any reference at all to the length or inclination of the obstacle. For example, C has a length horizontally, precisely equal to its greatest depth; D is twice as long horizontally as C; and E is twice as long horizontally as D; yet the current pressure against all three is precisely equal, that is, 8,000 lbs. against each; the same exactly as it exerts against the vertical board, B, supposing it had no inclines before it. The only influence the inclination of an obstacle has upon the current is, to divert its natural tendency to drive the obstacle before it to a tendency to lift when the obstacle has the form of an incline plane, and to crush its sides together when it has the form of a wedge.

Having thus far cleared the way, I will again proceed. The incline-board, C, being at an angle of 45°, that is, exactly midway between the vertical position of B and the horizontal board, A, it follows that the current pressure of 8,000 lbs. against C is exerted in tending to push A B C in the direction of the arrow. Now, this direction is exactly midway between the vertical board, B, and the horizontal board, A; it is, therefore, evident that half the current pressure, that is, 4,000 lbs., tends to drive A B C horizontally backward, and with the remaining 4,000 lbs., tending to lift it vertically upward. I think this fact cannot be misunderstood. Well, then, as the mid-angle of 45° of C compels the current to waste half its force in tending to lift A B C vertically upwards, it clearly follows that, by placing another board, D, at an angle midway between C and the horizontal dotted line, H, we double the horizontal length of C, and compel the remaining current-force of 4,000 lbs. again to waste half its pressure in tending to lift D. The current force, therefore, against A B D tending to drive it backward is only 2,000 lbs., the other 6,000 lbs. being uselessly exerted in tending to lift it. Thus as D is double the length horizontally of C, we lessen the horizontal force of the current against it from 4,000 lbs. to 2,000 lbs. Again, the incline-board, E, is double the length horizontally of D, and therefore has an angle exactly midway between D and the horizontal dotted line, H: by this arrangement the hold of the current is again reduced one-half. Its hold is now only 1,000 lbs. pressure, the remainder of its force amounting to 7,000 lbs., being wasted in tending to lift E vertically upwards.

From the preceding it will be seen that the result of my experiments was in complete accordance with sound science, and that my statement is true to the effect that, as we double the length of an incline plane, supposing we do not alter its depth or width, we lessen the resistance of water to its onward motion one-half.

In my former letter I stated, "The prin-

ciple of the incline plane is most favourable for giving a ship plenty of beam, with the view to the obtainment of great natural stability. If we double the width of an incline plane, we simply *double* the resistance of the water to its onward motion; whereas, if we double the beam of an ordinary ship, we increase the resistance of water to its motion *fourfold*." "N. B." has also denied the truth of this statement, and has again been unfortunate in his calculations. I will clearly show your readers that my statement is perfectly correct: let J, fig. 2, represent an incline plane moving in water. Now it is evident that if it meets with a resistance of 1 lb., another wedge, K, precisely similar in every respect, fastened to it, will also meet with a resistance of 1 lb. Thus the two will meet with a resistance, in all, of 2 lbs. There can be no doubt about this being true. With regard to doubling the beam of a ship having wedge-bows: let M M, fig. 3, represent the bows of a ship. It is evident that if we double the width of those bows, as R R, we double the area of the base of the wedge, and thus double the resistance of water to its motion; and we double the inclination of the wedge thereby, again doubling the resistance of the water, thus causing a *fourfold* pressure. When we double the width of an incline plane, we simply double the area of its base without disturbing its inclination; hence its great superiority over the wedge form in the obtainment of beam for a ship. With regard to "N. B.'s" prediction, that unless my trial-boat has a keel of so great a depth as to get the same amount of lateral resistance as ordinary ships, my vessel, as a sailing-boat, will be an utter failure. In reply to this, I beg to state that "N. B." is evidently quite unaware of the fact, that the capability of a sailing-ship going to windward depends upon her lateral resistance and the fineness of her entry, and not merely upon her lateral resistance. The finer the entry of a ship, the less propelling power she requires to move her at a certain rate, consequently the less she will drift. For instance, suppose two vessels, having an equal amount and form of side area, were going to windward, one a barge, having bows so bluff as to lessen the resistance of the water to her forward motion to one-half, and suppose the other vessel to be my trial-boat, having the same cross sectional area as the barge, but with an entry so fine and long, as to lessen the resistance to her motion to one-thirtieth. Now if these two vessels were moving to windward at a rate of eight miles per hour, which would drift the most? why, of course, the barge would drift fifteen times more than the trial-boat, because she would have fifteen times more side pressure against her canvas, or, in other words, she must then spread fifteen times more canvas than the trial-boat. A vessel having a bluff entry must rely almost entirely upon her lateral resistance to prevent her drifting when going to windward; but my trial-boat, having a very fine entry, requires very much less lateral resistance. But that there should be no mistake about the matter, when going to windward very rapidly she will be provided with a shifting-keel; by this arrangement her splendid steering qualities will not be lessened; nor will a rough sea knock her about and drift her so much then as were she to have a deeper keel. It must be recollected, that an extensive side area prevents a vessel drifting to leeward only when the water is tolerably smooth; the water being then motionless, or nearly so, offers great resistance to the lateral movement of a ship; but when going to windward in a rough sea, the water is then no longer motionless, and exerts against an obstacle a much greater force on the windward side of the vessel than on the other, so that she would then drift to leeward with the combined pressure of wind and water; consequently another vessel, having a less side area, would then be drifted less, because the hold of the waves upon her would be less.

I am, Sir, yours, &c.,

FREDERICK LIPSCOMBE.

Temple-bar.

SMOKE-CONSUMING FURNACES.

To the Editor of the Mechanics' Magazine.

SIR,—In one of your former Numbers you have honoured nearly every inventor of a valuable improvement in the combustion of coals, and consequent prevention of opaque smoke, with an introduction to the public, giving a description of the economy produced, and of the nature of his invention. You have gone even so far back, as to mention the improvements introduced by our immortal Watt, but you have entirely omitted to say a single word about my two patented improvements,—one for the better production of heat by the combustion of coals, and the other for the better utilization of the heat so produced, the prevention of incrustation of boilers, and consequent increase in the quantity of steam generated, beside great economy in coals, consumption of black smoke, and much longer duration of the boilers. The first of those inventions is called "The undulated fire-grate," and the second, "The metallic flues."

Both can be applied to every existing boiler. The fire-grate is fixed, and can be fed by hand, or by any suitable self-acting feeder. The metallic flues are a set of

circular tubes, through which the heat, after having been fully used under the boiler, passes to the chimney, and in which the cold supply water is heated by degrees to the boiling point, when it enters the boiler, purified from those ingredients which produce so many hard injurious sediments, often causing the explosion of boilers.

The benefit of my metallic flues is in proportion to the degree of pressure of the steam, and therefore the greatest in high pressure boilers. And the value of purifying the water, and supplying it in, or nearly in, a boiling state to the boiler, is greatest in those localities where the supply water is most impure, or mixed with minerals; so often the case in mining countries.

I believe that before me, very few inventors, if any, have given their attention to the economy and safety to be produced by using the lost heat escaping from the boiler into the chimney, to heat and purify the supply water. And as the public is hardly aware of the existence of such an invention, one which is so well calculated to protect steam-boilers from injury or explosion, I think that this alone would justify your insertion of this letter in your most valuable Journal, dedicated as it is to the bringing of inventions before the public.

But I might also perhaps claim it on other grounds, as, in my belief, not one of the new inventors has produced a greater economy and increase of steam than I can and have produced by uniting both those patents, even from very inferior common wagon boilers, and with low pressure steam. I can undertake to produce from the same coals 50 per cent. more steam, or save 33 per cent. in coals. I enclose two certificates from a firm in London, who have had both the above-named patents at work during the last ten years, and have them still in operation, and have produced a saving of five to six tons per week under a boiler of about 35 horse power. And the same boiler is still in good condition, having been protected during the ten years against any hard incrustation.

I enclose also a report from a well-known scientific gentleman, to the effect that no black smoke is issuing, but only thin, blue coloured vapours, not at all prohibited by law. I send also a drawing of the undulated fire-grate and the metallic flues for your inspection, to show the originality of the invention. It is strange, that although through ten years of practise these improvements have answered so beneficially, they are not better known and more generally adopted by the public; the fault may lie partly in my circumstances and partly in the powerful and cruel opposition I have experienced from parties largely interested in engineering and boiler-making, as I can fully prove. I hope, Sir, you will do me the favour and the justice, for the sake of the public benefit, to insert this letter in an early number of your widely circulated Journal.

I am, Sir, yours, &c.,

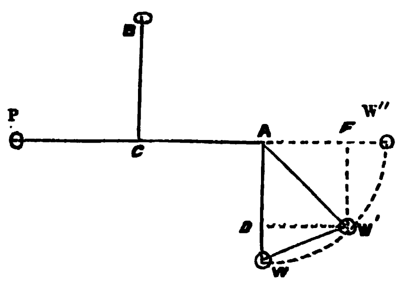
BERNHARD VON RATHEN.

ASCENSION IN BALLOONS.

*To the Editor of the Mechanics' Magazine.**

SIR,—In No. 1591, of the *Mechanics' Magazine*, is a reply by "J. C." to the letter of "Senex" on this subject, published in the preceding Number. He says, that the tendency of the tension of the string to pull the balloon down would be constant and equal to the weight of the body revolving at its extremity; and that the fallacy of "Senex's" notions lay in supposing that the body would ever move in the horizontal plane passing through the point of suspension.

As "Senex" puts the problem, it is certainly difficult to arrive at a different conclusion; I will, therefore, with your permission, propose it in a modified form, in which, perhaps, "J. C." will have a different opinion on it, and will admit that we have not erred in imagining that the balloon may, in this way, be relieved of a portion of the weight in question. This impression we think worthy of confidence, because it has been induced by our experience, which, we are inclined to believe, never leads us wrong.



Let B C be a shaft working through the bottom of the car of a balloon; C A and C P two equal arms; W, the weight; suspended from A, by the cord A W; P, a weight equal to W, attached to the extremity of the other arm. Let also the weight W be represented by the line A W.

Now, it is clear that W, when in motion, will have a tendency to fly off in the hori-

* We have slightly abbreviated this letter.—ED. M. M.

zontal plane, in consequence of the centrifugal force, since it is not connected with the centre of the circle in which it would otherwise move. But being attached to A by the cord, it is made to ascend the curve W, W′, W″; its position on it being determined by the magnitude of the centrifugal force, which again is dependent on the velocity.

Now, "J. C." says, "the resolved part of the tension of the string downwards must always equal the weight of the body." According to him, therefore, when the weight is at W′, the line A W represents this resolved part of the tension. But let us look at A W′ as a rigid rod, and forming with C A one piece (or with a joint at A, such as to permit its rising): now, since with the same velocity the circumstances of the motion remain unaltered, therefore W′ must evidently have lost some of its weight; for we must have

$$P.CP = W.'CF,$$

and C F is greater than C P; therefore W′ must be less than P.

Besides, in determining the tension of the cord A W′ we must not treat the centrifugal force as acting in the horizontal direction D W′ in the plane of its development; for its effect, evidently, is such as both to raise the weight to W′ and hold it in equilibrium in that position. The resultant, therefore, of the other two forces, the weight and the tension of the cord, must be in the direction of the centrifugal force. This clearly is so, because W′ attains its position not through the agency of any force generated from the centre of the horizontal circle through W′, but in consequence of the excess of the momentum acquired while rotating about a centre lying below the plane D W′, the effect of which would be to carry it on horizontally in its own plane; but as it is turned up in the curve W W′ W″, by the cord, its action must be in a direction the mean between the two.

From all these considerations we are led to the following results:—When the weight is at W′ the resolved part of the tension downwards is represented by A D, and the balloon is relieved of a weight represented by W D. This effect would be doubled if we had another cord and weight similarly attached to the other arm, C P. If D be the vertically resolved part of the tension, then since it decreases with the angle W′ A W″ ($=\theta$ suppose)

$$D = W \sin \theta.$$

When $\theta = 0$ (and there is nothing to prevent the weight from moving in the horizontal plane through C), the balloon is relieved of the whole; and we shall have, with two such weights oppositely placed, the remaining horizontal forces counteracting each other. Thus the effect of rotation is to destroy gravity by transforming it into a radial force; and it is left to experiment to determine the needful velocity.

I am, Sir, yours, &c.,

A.

London, March 1, 1854.

MATHEMATICAL PERIODICALS.

To the Editor of the Mechanics' Magazine.

Sir,—I find it impossible to be anything but amused by the miserable artifices adopted by your correspondent, Mr. Tebay. His last letter contains the usual amount of abuse, but not one word in opposition to the *proofs* I offered in support of the statements in my former communication. He has evidently exhausted his resources. The *names* of these mutual friends do not appear to be forthcoming for your own satisfaction; nor is he more felicitous in his language, when alluding to the matter of *pecuniary considerations*, than when exhibiting his skill in perverting a few of the letters of the alphabet. Instead of confining himself to the matters in dispute, he contrives to evade the main question altogether. The *real* "Simon Pure" is abandoned to his fate, and he now endeavours to lead your readers astray by treating them to a pretended *exposé* of my own pratices, as illustrated by his extracts from my correspondence with him at the beginning of last year. Had he told the *whole* truth, I should not have noticed his last effusion; but since such is evidently not his intention, I hope to be pardoned while I "furnish" the remainder of this "strange eventful history." The extracts from my letters are correct, *as far as they go;* but Mr. Tebay does not find it convenient to state that in this same correspondence I told him *that I had solved Questions* 1 *to* 12 *and* 14; *that I did not intend to try Questions* 13 *and the Prize, since they belonged to subjects I had not much studied; and that I also enclosed him a copy of my own solution to the "neck-and-neck race question!!!* Moreover, this very interchange of *results* arose from his own voluntary proposal; for on referring to this correspondence I meet with the following very *curious* and instructive passages:

"The neck-and-neck-race question struck my eye, and I could not refrain from trying it. It came out in about a couple of minutes most astonishingly. Ans. $\alpha\beta$." "I find seven answers to Question 1, and in the twilight question I find the latitude and longitude answering to February 24th and October 17th. If you wish to know

my results to any of the other questions I will send you them. *Have you made out the first enigma? If you have, I should wish to know it.*"

Mr. Tebay is too cautious to affirm that he ever "furnished" *me* with any *solutions* to mathematical questions. He is also well aware that my statements respecting the doings in our periodicals will not admit of *fair* denial, and I can produce a letter from a common friend which assures me that Mr. Tebay's theory of mutual exchanges "is a pure fabrication of his own." Under such circumstances, I can well afford to leave the matter in the hands of your readers, who will now be able to *judge* which of us is entitled to the epithet of the "*fair* antagonist;" and should this embryo divine ever proceed so far in his academical course as to seek ordination, I hope he will take care to profit much by the advice contained in the Scriptural quotation he so very devoutly offers for my consideration.

I remain, Sir, yours, &c.,

T. T. WILKINSON.

Burnley, March 4, 1854.

PLATING STEEL OR IRON.

To the Editor of the Mechanics' Magazine.

SIR,—You will confer a favour on me and many others if you allow me to ask one of your able correspondents for a description of a satisfactory process of *plating steel or iron.* In all my attempts, in which I have followed formulæ from books, the silver peels off.

Believe me, Sir,

A SUBSCRIBER SINCE 1837.

Dublin, Feb., 1854.

On the Application of Cast and Wrought Iron to Building Purposes. BY WILLIAM FAIRBAIRN, C.E., F.R.S., F.G.S., ETC. London: John Weale, 1854.

THIS is one of those invaluable works, by publishing which Mr. Weale occasionally does essential service to the public. In it Mr. Fairbairn has collected the scattered elements of our practical knowledge on the uses of cast and wrought iron, in the construction of *fire-proof* buildings. This subject is attracting considerable attention at the present moment. Papers upon it have been read at the Royal Institute of British Architects, and have given rise to important discussions, in which the comparative merits of the French and English systems have been elaborately dealt with. From these circumstances it is apparent that the publication of Mr. Fairbairn's work is exceedingly opportune; and we have no hesitation in saying, that it is well calculated to convey clear and accurate information to many who are anxiously seeking it. The object of the author has evidently been to bring the knowledge acquired by long and extensive practical experience into such a form, that it may be easily and profitably consulted by engineers and architects. This he has succeeded in accomplishing; and from the circumstance of his having derived his main facts either directly from his own observation or from the experiments made at his establishment by Professor Hodgkinson, is entitled to, and will receive the full confidence of his readers.

We do not purpose presenting a summary of the contents of the volume, but there are a few topics discussed in it to which on account of their practical importance we cannot refrain from directing attention.

One of these is the unsatisfactory, and indeed dangerous character of compound or trussed cast-iron beams or girders. A variety of opinions have been entertained upon the utility of trussing such beams with malleable rods, and much ignorance and misapprehension still exist concerning it. We are therefore particularly gratified to observe that Mr. Fairbairn has taken pains to establish the fact, that under the most favourable circumstances there is not much gained in strength by this arrangement, while in other cases, "the beams would be safer without the truss-rods than with them."

We wish we had space to transcribe the author's sensible remarks on the importance of attention to the mixture of metals for producing castings suited to different purposes. To the want of proper care in this matter are attributed all the anomalous conditions of soft and hard, strong and weak irons, and many defects which might be avoided by a more attentive regard than is ordinarily paid to the quality and proportion of each particular iron, and the quantities of carbon and flux used in their liquefaction. "We have yet much to learn," says Mr. Fairbairn, "in the preparation of metals, as well as in the manipulative art of moulding, and the necessary process of ventilation; a process which requires no inconsiderable degree of thought and skill."

But the principal portion of the book is that which treats of the use of *wrought-iron* beams for supporting the floors of buildings and for other purposes. It was but recently that such beams were first brought into use, and although they have been gradually applied to new and more important purposes,

such as to the construction of iron ships, and railway and tubular bridges, yet we are persuaded that our engineers and builders have waited for authoritative information upon the subject, and that without this there was but little chance of seeing brought about that general application of them which both safety and economy render desirable. Such information is here, however, supplied; and we think we cannot do our readers a greater service than by concluding this notice of Mr. Fairbairn's valuable book with a few remarks of his upon the subject:

"From the increased safety and greatly increased strength of the wrought-iron beam, it appears to me to be in every respect adapted to the construction of fire-proof buildings. It offers much greater security, and is free from the risk of those accidents which not unfrequently occur with cast-iron beams, and which have created so much alarm in the public mind. We have already shown the superior adaptation of this material to bridges and other structures where strength and security are the principal objects of its application. It now becomes a consideration of some importance to exhibit the advantages which may be gained by its introduction, on a large scale, into the building of warehouses, cotton and flax mills, and dwelling-houses, which require protection from risk, whether arising from weakness, from the employment of a dangerous material, or from fire. In these erections it will be found exceedingly valuable, irrespectively of the sense of security which the nature of the material is sure to establish in the public mind. Impressed with these convictions, I unhesitatingly recommend its adoption to the architect and engineer; and provided the laws which govern its strength be carefully attended to, I have every reason to believe that a few examples will not only give entire confidence in its powers, but that increased experience will elicit improved conditions, and probably better forms for its application."

* * * *

"Another feature in the use of this material is the scope which it gives for an extension of space to any distance commensurate with the convenience of the establishment, or the taste of the architect or engineer. Most of the improved cotton-mills are from 60 to 65 feet in width, with two or three rows of columns, at distances of 15 to 16 feet across the mill, and from 9 to 10 feet in the direction of its length. These columns present serious obstructions to the convenient arrangement and free working of the machinery, but they cannot well be avoided where cast-iron beams are used. By the employment of wrought iron they quickly vanish, as one row of columns in the middle, with only two beams in width, not only meets the objection, but removes all doubts as to the security of the structure. In these constructions, however, it must be borne in mind that an increase of space is attended with a considerable increase of expense; but when the latter is not a serious consideration, fireproof mills might be built upwards of 60 feet in width without the introduction of a single column or any other obstruction whatever.

* * * *

"Now a cast-iron beam, of the best form and strongest section, and calculated to support the same load, would weigh about 2 tons, whereas the wrought-iron beam would only weigh 16 cwt. 1 qr. 14 lbs., or little more than one-third of the weight of the cast-iron beam. This difference of weight is of considerable importance, as the advantages of using the plate-beams do not consist solely in the saving of nearly two-thirds of the material, but there is less weight to carry, and much greater certainty as regards the ultimate strength and security of the beams. Let us, however, extend the comparison still further, and endeavour to ascertain the cost of the material and construction of each kind of beam, which, after all, is the only criterion of the utility and fitness of any improvement. Every invention resolves itself into this comparison; and in order to secure a successful application, the superiority of the article (when other things are the same) must be measured by the price at which it can be produced. Assuming, therefore, that cast-iron beams can be delivered at the foundry at £6 10s. per ton, and that the wrought-iron plate-girders can be manufactured at £16 per ton, it follows that

A cast-iron beam, 40 cwt., at 6s. 6d.	£13 0 0
A wrought-iron beam, 16 cwt. 1 qr. 14 lbs., at 16s.......	13 2 0

making a difference of only two shillings between the cost of the one and the cost of the other. Assuming, therefore, the prices to be the same, we have, in the case of wrought-iron beams, only about one-third of the weight of metal to carry; and, moreover, the superior lightness of the wrought-iron will enable us to erect and fix them in their places at considerably less cost. Altogether, therefore, I am persuaded that the wrought-iron beams, if manufactured on a large scale, can be executed at a moderate rate, and can be made to answer that most desirable object, the combination of strength with lightness and security. Besides, I am persuaded that beams of this description can be manufactured at £14 per ton, instead of £16, as

quoted above. If this can be accomplished, there is a direct saving of £1 10s. 9d. per ton; a very important economy, independently of the increased security.

"Should this description of beam become general in its application, it is more than probable that all those under 12 cwt. might be delivered at once, of the required form, from the rolling-mill; and it would be premature to assume that even the larger sizes, such as we have just described, could not be manufactured in the same way. The skill and intelligence of the iron manufacturers of this country have surmounted greater difficulties; and I have no doubt that a demand has only to be created in order to insure perfect success in all the manipulations connected with that important process. If this could be accomplished, a very important saving of the mineral treasures of the country would be effected; nearly two-thirds of the metal would be saved, and the price (supposing the beams to be taken from the rolls) reduced to nearly one-half, or from £16 to £8 or £10 per ton. Under these circumstances, cast-iron would be no longer admissible for such a purpose, and buildings would be rendered much more secure from the chance of failure, and equally secure from the ravages of fire."

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Pigé, Alexis, of Greek-street, Soho, Middlesex, gentleman. *Improvements in locks and their keys.* (A communication.) Patent dated August 18, 1853. (No. 1932.)

Claim.—The construction of keys with collapsible wards or levers, in combination with locks having sliding bolts which close the small round opening or keyhole, by which the key in its collapsed state is introduced.

Fairbairn, Peter, of Leeds, York, machinist. *Certain improvements in heckling machines.* Patent dated August 18, 1853. (No. 1935.)

This invention relates to certain improvements in the "intersecting heckling machine." The inventor forms the "slides," or stationary endless guides in which the ends of the heckle-bars work, so that the heckle-pins, when brought round to act upon the fibre under operation, shall be caused to move in a vertical plane, or nearly so, until they leave the strick; and in order to drive the heckle-bars he connects them by means of links to radial arms or their equivalent, which by their rotation carry round the bars, while the guides adjust the heckle-pins to the proper position for combing or heckling the fibre.

Curtain, William, of Retreat-place, Homerton, Middlesex, carpet-designer. *Improved machinery for printing textile fabrics, oil-cloths, leather, paper-hangings, and other similar fabrics or materials.* Patent dated August 18, 1854. (No. 1936.)

This apparatus is composed of three principal parts. First, the series of blocks on which the pattern is engraved; second, the colouring apparatus, whereby the colour is applied to the block; and, third, the press, by which the impression is transferred from the blocks to the material or fabric to be printed. The blocks are mounted in a travelling frame, which is made to run on guides or rails placed on each side of the machine, so that the blocks may be brought one by one under the press in their proper order to produce the pattern. The colouring apparatus consists of a suitable number of troughs, according to the number of colours to be printed, and each of these troughs is provided underneath with a colour-roller, over which passes an endless sheet or blanket, which receives the colour from the roller, and carries it into or across the machine and under the colour blocks, which are mounted on pins at their four corners, and are sustained by means of coiled springs at each corner.

Cornelius, William, of Panton-street, Haymarket, Middlesex. *Improvements in gilding porcelain, glass, and such like materials.* (A communication.) Patent dated August 18, 1853. (No. 1937.)

This invention relates to the preparation of the gold employed for the purpose described in the title. The inventor dissolves the gold in nitro-muriatic acid, and precipitates it by pure liquid ammonia (such as is commonly used by engravers), and then washes and carefully filters the solution through an ordinary filter, and thus obtains a voluminous yellow metallic residuum, which, for the purposes of the invention, should be kept in a moist state with oil until it is required to be used in the manufacture of the gilding preparation. When used for such purpose he mixes the residuum with a corrosive mixture, composed of two parts of the finest rosin of Burgundy and two parts of the varnish used by printers; "and when the mass has been thoroughly mixed and incorporated together, and is perfectly dried, it is then entirely divested of its explosive property, by which it can be worked with safety; and this compound, when mixed with boracic bismuth, I have found to produce gilding of great solidity, but which requires slightly burnishing."

De Bergevin, Auguste Mathieu Maurice, of Paris, France. *Improvements in the manufacture of coke, and in the apparatus connected therewith, and in treating the*

products obtained therefrom. (A communication.) Patent dated August 18, 1853. (No. 1938.)

The improvement in the manufacture of coke from coal consists in clearing or freeing the coke from the sulphuretted hydrogen which it contains; and the purifying process consists, firstly, in rectifying the bituminous matters contained in coal, so as to render them useful for the purposes of artifical light, and in further rectifying them to render them available for and capable of entering into the composition of all kinds of paints and colouring matters.

WATT, CHARLES, of Selwood-place, Old Brompton, and HUGH BURGESS, of Percy-street, Bedford-square, both of Middlesex. *Improvements in disintegrating and pulping vegetable substances.* Patent dated August 19, 1853. (No. 1942.)

The inventors take (for example) chips, shavings of wood, or sawdust, and boils them for some hours in water, passing a stream of sulphurous acid through the mass, till a partial bleaching is effected. The matters are then well washed, and placed in a solution of chlorine, chloric, or chlorous acid, in which they are kept till they are quite white, and the fibres disintegrated. After the above treatment, the fibrous mass is heated in a warm and dilute solution of caustic, soda, or potash.

HAYES, GEORGE, of Bolton, Lancaster, manufacturer. *Improvements in looms.* Patent dated August 19, 1853. (No. 1943.)

Claims.—1. A method of working and causing the shuttle-box to slide backwards and forwards. 2. An improved shape of tappet. 3. A method of working the stop-motion by a spring check-strap connected to the pickers.

KIMBERLEY, JAMES, of Birmingham, Warwick, wholesale ironmonger and manufacturer. *An improvement or improvements in raising and lowering various kinds of window-blinds, and in opening and closing window and other curtains; applicable also to the raising and lowering or winding and unwinding of maps and other sheets or articles, and to the closing of doors.* Patent dated August 20, 1853. (No. 1944.)

Claim.—"The application of one or more cords or lines of vulcanized caoutchouc, or other elastic substance, to the raising and lowering of window-blinds, &c., &c."

POLAILLON, JEAN BAPTISTE, gentleman, and FRANÇOIS MAILLARD, starch manufacturer, both of Lyons, France. *Improvements in the manufacture of starch.* Patent dated August 20, 1853. (No. 1946.)

This invention consists in producing starch from grain, by separating it from other substances with which it is in combination without fermentation or the employment of acids, the separation being effected by mechanical agency, in combination with a washing process, by which the starch is washed out, leaving the other substances behind.

SIEVIER, ROBERT MOORE, of Louviers, France, manufacturer. *Improved machinery for the manufacture of terry or cut-pile fabrics, parts of which are applicable to the weaving of other fabrics.* Patent dated August 20, 1853. (No. 1947.)

This invention relates—1. To the construction of the lay or batten, and consists in separating the two parts or ends where the shuttle-boxes are situated from the central part, in which the reed is placed. 2. To the construction and application to a loom of apparatus for introducing and withdrawing the terry or other wires from the fabrics as they are being woven. 3. To an arrangement of machinery for cutting or separating into two pieces a fabric woven together as a double cloth. 4. To the employment of a peculiarly constructed wedge or opener, or series of wedges or openers, for the purpose of keeping the bodies of the fabrics at an equal distance apart, at the place where the knife effects the separation of them. 5. To improvements in the construction of the cutting wires, which consist in making the ends of such wires broader or thicker than the other parts, in order to give them a wider bearing against the fabrics, and thus prevent them from inclining on one side; and, 6. To a mode of cutting asunder the cloths in such a manner as to make one a longer pile than the other, thereby producing separate qualities of cloth when such are desired.

VAUGHAN, WILLIAM, of Stockport, Chester, gentleman, and JOHN SCATTERGOOD, of Heaton Norris, Lancaster, machinist. *Certain improvements in machinery, apparatus, or implements for weaving.* Patent dated August 20, 1853. (No. 1948.)

Claims.—1. A described mode of attaching the driving-pulley and fly-wheel, or either of them, to the crank-shaft of the loom by a "friction-clutch," and also a particular construction of the said "friction-clutch." 2. A mode of obtaining the projectile force necessary to effect the pick from the motion of the sleigh or sleigh-swords, and of alternately throwing out of gear the picking apparatus on each side of the loom, so as to obtain a pick from alternate sides. 3. A method of forming the shed in plain weaving, by means of the reciprocating motion of a transverse shaft placed beneath the healds, and actuated by a rack and pinion-movement derived from the crank-shaft, as described. 4. A method of producing the variable "dwell" in the shed. 5. The use of elastic bands or straps

of India-rubber, or of elastic webs partly composed thereof, for the purpose of attaching the heald shafts to the bosses. 6. An arrangement of apparatus for the purpose of applying moisture to the materials in process of being woven. 7. A mode of applying moisture to the fell of the cloth, by means of a roller or rod carried in front of the sleigh, and applied to the fell by the motion of the sleigh itself. 8. A mode of raising water from the trough by means of an endless web passing over a revolving roller. 9. A mode of maintaining an equable supply of water in the trough, by means of a constant regulated influx from a separate vessel and an overflow-pipe. 10. The use of elastic bands or hoops of India-rubber or of India-rubber web, for suspending or pressing down the cloth-beam of looms. 11. A mode of giving to the rollers of self-acting temples a motion towards the selvage of the fabric, and parallel to their own axes when working. 12. The addition of teeth or protuberances to the lower side of the guiding-fingers of self-acting temples, for the purpose of restraining the cloth from slipping inwards along their edges. 13. An arrangement whereby self-acting temples are adapted to the weaving of wet materials, by enabling the cloth to be passed under instead of over the front roller, and removing the guiding-finger and all other impediments to the access of the wetting-roller.

CUNINGHAME, ALEXANDER, of Glasgow, Lanark, North Britain, iron-master. *Improvements in the manufacture or production of alkalis and their salts, or alkaline salts.* Patent dated August 20, 1853. (No. 1949.)

Claims.—1. An arrangement of apparatus for the manufacture of sulphate of soda and sulphate of potash, as described. 2. The employment and use of alum slate, alum schist, and black stone in the manufacture or production of sulphate of soda and sulphate of potash.

LOMAS, SAMUEL, of Manchester, manager. *An improved silk-cleaner.* Patent dated August 22, 1853. (No. 1951.)

This invention consists in constructing silk-cleaners with revolving rollers placed near each other, so that the slubs in the silk thread will be prevented passing between them.

STEVEN, JOHN, of Edinburgh, Scotland, railway carriage builder. *An improved axle-box for railway carriages and wagons.* Patent dated August 22, 1853. (No. 1952.)

Claims.—1. A mode of constructing axle-boxes in one solid piece. 2. A mode of constructing axle-boxes with their bearing-springs set directly upon them. 3. A mode of constructing axle-boxes with two recesses for holding the bearing-springs. 4. The application and use of buckles or clasps for securing the bearing-springs to the axle-box tops. 5. The upward extension of the bearings of axle-boxes for the conduction of the lubricating matter.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, Holborn, London. *Improvements in the manufacture of certain mineral oils and paraffine.* (A communication.) Patent dated August 22, 1853. (No. 1953.)

Claim.—The manufacture of oil containing paraffine by distilling bituminous matter in furnaces containing both the fuel from which the heat is derived, and the bituminous matter from which the oils and paraffine are to be extracted; also the construction of the furnaces in such manner that the combustible residue left after the volatile products are expelled may serve as the fuel for successive distillations.

WARMONT, VICTOR EMILE, of Neuilly, Seine, France. *Improvements in dyeing and ornamenting skins, fabrics, and other substances.* Patent dated August 22, 1853. (No. 1954.)

Claim.—A described manner of producing patterns by dyeing and pressing them together with the colouring matter between boards, and subjecting them to heat and moisture.

OSBOURN, FREDERICK, of Albion-street, King's-cross, Middlesex, tailor. *Improved machinery for cutting woven and other fabrics.* Patent dated August 22, 1853. (No. 1955.)

The chief object of this invention is to facilitate the cutting out of cloth for garments. This the inventor proposes to effect by the aid of a reciprocating knife, which is worked by a crank or other similar contrivance.

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in crushing and pulverizing quartz and other substances.* (A communication.) Patent dated August 23, 1853. (No. 1958.)

Claim.—The construction of a machine with corrugated or toothed surfaces working into each other.

WEBSTER, JAMES, of Leicester. *Improvements in pressure gauges.* Patent dated August 23, 1853. (1959.)

In Mr. Webster's gauge, the glass tube is fixed in a globular, or other suitably formed vessel, which has a thin metal (by preference steel) partition across it. Mercury is placed on one side of the partition, and water or other fluid on the other, and the globular vessel is fixed on a cylinder which is closed at bottom, but has a pipe rising up through the closed end, over which pipe is fixed an inverted vessel or tube.

When the instrument is in use, the steam or other fluid acts upon the water, and by its pressure against the partition, the mercury is caused to rise up the glass tube, and to indicate the pressure.

Medwin, Thomas Charles, of the firm of Messrs. Medwin and Hall, Blackfriars-road, Middlesex, engineers. *Improvements in steam-engine boilers.* Patent dated August 23, 1853. (No. 1960.)

This invention consists—1. In appplying a coiled tube within the fire tube or flue of a steam boiler, one end of such coiled tube being connected with the boiler, and the other end connected to the feed-pump. 2. Forming the upper part of the boiler concave, so as to offer a hollow channel for the reception of the steam cylinder and working parts of the engine.

Rettie, William, of Aberdeen, Scotland, lamp-manufacturer. *An improved construction of submarine lamp.* Patent dated August 23, 1853. (No. 1961.)

That part of Mr. Rettie's lamp which contains the hydrocarbon and the wick is inserted in a glass globe or other transparent watertight vessel, which has affixed to its upper part a tube composed of lengths connected together by union-joints, so that the length of the tube may be increased or diminished at will. Connected to the upper end of this tube is a lantern-top, which allows air to enter the tube and pass down to feed the flame of the lamp; and in the centre of the same tube, and projecting into the glass globe is a smaller one, provided with a trumpet mouth at its lower end. The use of this is to collect and carry upwards the gases of combustion, and deliver them at the escape orifices of the lantern.

Herbert, Thomas, of the firm of Thomas Herbert and Co., of Nottingham, lace-manufacturers, and Edward Whittaker, of Nottingham, mechanic. *Improvements in warp-machinery employed in the manufacture of purled and other fabrics.* Patent dated August 23, 1853. (No. 1962.)

Claim.—The application to a bar traversing, by means of a Jacquard or wheels, over one or more needles, of as many ticklers as required to make the vandyke or scolloped edge; also certain wheels working either separately or jointly at one end of the machine to make a spotted fabric.

Whiteley, John, of the firm of Whiteley, Ward, and Co., lace manufacturers, of Stapleford, Nottingham. *Improvements in warp-machinery for the manufacture of textile fabrics.* Patent dated August 23, 1853. (No. 1963.)

Claim.—Giving a continuous motion to a needle-bar worked by an eccentric, the threads being lapped on the needles as they are moving backward and forward.

Mann, William, of Stepney, Middlesex, gas-engineer. *Improvements in the purification of gas, and in the treatment of the material used in such purification.* Patent dated August 23, 1853. (No. 1964.)

Claims.—1. The purifying of gas from carbonic acid by ammonia, in combination with the water which is mixed with the lime, to prepare it for dry lime purifying. 2. Certain means of ventilating or deodorising the foul lime. 3. Using a deodorising or ventilating medium which cannot form an explosive mixture with coal-gas.

Hine, Benjamin Hornbuckle, and Anthony John Mundella, of Nottingham, manufacturers, and Thomas Thompson, also of Nottingham, mechanic. *Improvements in machinery for the manufacture of textile and looped fabrics.* Patent dated August 24, 1853. (No. 1967.)

In this arrangement the thread from the cop is carried under the frame-needle beards by a loop wheel, and as the needles turn round they are depressed by the lower part of a collar, thereby bringing the beards to the frame-dresser; this having pressed the work, is knocked over by the top of another collar, and the work is then drawn back ready for the machine-presser to operate upon, when a plate draws the machine needles back, and the work is again knocked over by another piece. The frame needles then rise, the machine needles are thrown out, and the course is repeated.

Culverhouse, George, of English-street, Hull. *Improvements in the manufacture of compost or manure.* Patent dated August 24, 1853. (No. 1968.)

This invention consists in the employment of a boiler and apparatus for boiling bones and other matters under pressure, in the manufacture of compost or manure, the upper part of the boiler used being separate from the lower, so as to be lifted off it when necessary.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

Hughes, Thomas, of Birmingham, Warwick, brassfounder. *An improvement or improvements applicable to writing slates, pocket and memorandum-books, and other such like articles.* Application dated August 18, 1853. (No. 1939.)

This invention consists in applying a spring clip or holder to slates, memorandum and pocket-books, &c., for the purpose of holding the pencil to be used therewith.

De Fabeck, Frederick William Alexander, of Portland-road, Middlesex. *The construction of viaducts, bridges, lintels, beams, girders, and other horizontal structures*

or supports. Application dated August 19, 1853. (No. 1940.)

The lintel, beam, girder, or other support is to be composed of a double row or series of frames, the parts of which enclose triangular parts, every other of which in each row or series is inverted.

LUTWYCHE, ALFRED, of Birmingham, Warwick. *An improved mode of manufacturing steel or other metallic pens.* Application dated August 19, 1853. (No. 1941.)

This invention consists in an arrangement of the cutting-out tools by which waste is altogether avoided, except in the curving of the points and rounding of the ends. This is effected mainly by forming a stop or stops in the top tool, which stop or stops are sufficiently long to descend into the under or bed-tool; these stops regulate the advance of the metal, which must be pushed forward to them at each turn of the press.

SCHMOLLINGER, WILLIAM, of Gracechurch-street, London, gentleman, and EDWARD GRAINGER SMITH, of Lambeth, Surrey, machinist. *Improvements in the means of converting reciprocating or rectilinear motion into rotatory motion.* Application dated August 22, 1853. (No. 1950.)

This invention consists in a peculiar arrangement of a drum-cylinder or cone having a male or female screw formed either on the external or the internal surface, such screw returning backwards into itself; it is furnished with a suitable guide or slide-piece working within the thread of the screw.

COWPER, CHARLES, of Southampton-buildings, Chancery-lane, Middlesex. *Improvements in the permanent way of railways.* (A communication.) Application dated August 23, 1853. (No. 1956.)

In carrying out this invention, rails are to be made consisting of a broad flange with a central part projecting above it and a similar projection below it, so that it may be placed with either side uppermost; the upper projection serving for the wheels of the carriage to run upon, while the lower projection is bedded in the sleeper or bearer, or in the ballast upon which the broad flange rests.

BROWN, WILLIAM, of Glasgow, merchant. *An improved mode of obtaining volatile products from bituminous coals and other bituminous substances.* Application dated August 23, 1853. (No. 1957.)

This invention consists in dispensing with the use of the vessels now employed in separating the volatile from the fixed constituents of coal or other bituminous substances, and conducting this process in the furnace itself.

MCLEISH, WILLIAM, of Battersea, Surrey. *A machine for destroying weeds.* Application dated August 23, 1853. (No. 1965.)

Mr. McLeish's machine destroys the weeds by the following means. The roller upon which the machine rests is heated in a hollow fire-grate, which is constructed so as to enclose the roller all round, except at the bottom, where an opening is left for the roller and hot blasts to come in contact with the surface of the ground.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, Holborn. *Improvements in fire-arms.* (A communication.) Application dated August 24, 1853. (No. 1966.)

This invention consists of placing a hollow metal drum or cylinder, which is open at one end, outside the barrel near the breech, with its open end turned towards the barrel, to receive an ear which projects from the latter and fits to some part of the interior surface of the drum, in such manner as to form a joint, which remains perfect when the drum revolves upon its axis. The ear contains the vent which terminates in that part of its surface which fits to the drum, and the latter is furnished with a series of nipples, so arranged that as the drum revolves on its axis their holes may be brought successively into communication with the vent through the ear.

FOSTER, THOMAS, of Manchester, Lancaster, engraver and lithographer. *Certain improvements in machinery or apparatus applicable to etching or engraving upon plain cylindrical, or other surfaces.* Application dated August 24, 1853. (No. 1969.)

The principal feature of novelty in this invention consists in attaching the diamond or other etching or marking point or points directly to the rod or bar to which the tracing point is fixed.

PROVISIONAL PROTECTIONS.

Dated January 3, 1854.

17. Julian Bernard, of Regent-street, Middlesex, gentleman. Improvements in the manufacture of boots and shoes, part of such improvements being applicable to the manufacture of garments.

Dated February 14, 1854.

353. Thomas Bury, Walter Glover, James William Speed, and John Hardman, all of Salford, Lancaster. Improvements in machinery or apparatus for stretching, drying, and finishing yarn and woven fabrics composed of cotton, wool, silk or other fibrous materials.

355. Louis Faure, of Paris, France. Improvements in the process for manufacturing iodine.

357. Thomas Irving, of Mould Green, near Huddersfield. Improvements in obtaining a metallic and lustry appearance to fabrics and yarns.

359. Arthur Jonson, of Mitcham, Surrey. Improvements in preparing barley and grits or groats.

361. Patrick O'Connor, of Wavertree, near Li-

verpool. An improved lever hinge for suspending and closing doors and gates.

Dated February 15, 1854.

363. John Potter, of Manchester, civil and consulting engineer. An improvement or improvements in machinery for preparing, spinning, and twisting cotton or other fibrous substances, applicable also to machinery for winding threads or yarns of the same.

365. Benjamin Hornbuckle Hine and Anthony John Mundella, of Nottingham, manufacturers, and William Onion, also of Nottingham, mechanic. Improvements in machinery for the manufacture of textile and looped fabrics.

367. Thomas Jennings, of Brown-street, Cork, Ireland, mineral-water manufacturer. Improvements in stoppers for bottles.

369. George Fergusson Wilson, of Belmont, Vauxhall, managing director of Price's Patent Candle Company. Improvements in preparing an oil, and in the manufacture of candles and night-lights.

Dated February 16, 1854.

371. Cromwell Fleetwood Varley, of Charles-street, Somers' Town, Middlesex. A new arrangement or apparatus for transmitting electric telegraph signals.

373. John Greenwood, of Irwell Springs, near Bacup, Lancaster, Turkey-red dyer, and Robert Smith, of Bacup, manufacturer. Improvements in sizeing, stiffening, and finishing textile materials or fabrics.

375. John Davie Morries Stirling, of the Larches, Camphill, near Birmingham. Improvements in the manufacture of steel.

377. George Fergusson Wilson, of Belmont, Vauxhall, managing director of Price's Patent Candle Company. An improvement in the manufacture of lubricating matters.

Dated February 17, 1854.

378. Thomas Fawcett the younger, of Lisburne, Antrim, Ireland. Improvements in weaving linen or other fabrics to produce plaits or folds therein.

379. Thomas Telford Macneill, of Mount Pleasant, Lowth, Ireland, civil engineer. Improvements in drying flax, straw, and other organic substances.

380. Alfred Ford, of Lowndes-street, Belgrave-square, Middlesex, surgeon. Certain improvements in manufacturing varnish.

381. Henry Ross, of Nottingham, gentleman. Improvements in machinery for the manufacture of textile and looped fabrics.

382. William Wright, of Wolverhampton, Stafford, gardener. Improvements in ornamenting walls and other similar surfaces.

383. George Smith, junior, of Belfast, Ireland, civil engineer. Improved machinery for retarding and stopping railway carriages.

384. George Wethered, of Maidenhead, Berks, coal merchant. Improvements in machinery or apparatus for shaking straw.

385. Joseph Hinchliffe, junior, of Dam Side, near Halifax, York, cotton spinner. Certain improvements in metallic pistons for tightening or adjusting the packing of the same, and also improvements in the construction of such pistons. A communication.

386. Robert Holt, of Shaw, near Oldham, Lancaster, engineer. Certain improvements in machinery or apparatus for manufacturing bricks and tiles.

387. Ellis Rowland and James Rowland, of Wakefield-street, Manchester. Improvements in cleaning the tubular flues of steam boilers.

388. Moses Poole, of Avenue-road, Regent's-park, Middlesex. Improvements in boiler-furnaces and other furnaces. A communication.

Dated February 18, 1854.

389. Peter George Harris, of Buckingham-street, Adelphi, Middlesex, engineer. Improvements in locomotive engines. A communication.

390. William Morrison, of Bowling, Dumbarton, North Britain, engineer. Improvements in railway wheels.

391. John Collis Nesbit, of the Chemical and Agricultural College, Lower Kennington-lane, Surrey. Improvements in the manufacture of manure.

392. Benjamin Weston Wells, of Windmill-lane, Camberwell, Surrey, floor-cloth manufacturer. Improvements in printing floor and other cloths.

393. Edward Loysel, of Rue de Grétry, Paris, France, civil engineer. Improvements in apparatus for obtaining infusions or extracts from various substances.

394. Bashley Britten, of Anerley, Surrey, gentleman. Improvements in crushing, pulverizing, and washing mineral earths or ores, and amalgamating the gold and silver contained therein, which said improvements are also applicable to crushing and pulverizing other substances.

Dated February 20, 1854.

396. Nicholas Riggenbach, of Basle, in Switzerland, engineer. Apparatus for preventing incrustation in steam boilers.

398. John Aspinall, of King William-street, London, engineer. An improvement in machinery employed in the manufacture of sugar.

400. Thomas Gray, of St. Clement's-lane, Strand, London. Improvements in the manufacture of pulp from wood.

402. James Beall, of Effingham-place, Cheshunt, Herts. Improvements in apparatus for suspending looking-glasses in frames.

404. Thomas Towers, of Salford, Lancaster, gentleman. Certain improvements in marking boards used in connection with billiard and bagatelle tables, for registering and indicating the number of games played.

Dated February 21, 1854.

408. John Ramsbottom, of Longsight, Manchester, engineer. Improvements in welding.

410. Henry King, of Gilbert-street, Oxford-street, Middlesex, wholesale perfumer. An improved mode of signalizing between the guard and driver of a railway train.

412. Victor Pernollet, engineer, of Broad-street, Golden-square. Improvements in machinery or apparatus for sorting or separating wheat and other grain from different kinds of grain, and for separating or removing extraneous matters from wheat and other grain.

414. Robert Walker, of Glasgow, Lanark, North Britain, merchant. Improvements in signalling by voltaic electricity, for the purpose of increasing the safety of railways.

416. Ernst Gessner, of Ane, near Schneeburg, Saxony. Improvements in gig-mills.

418. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in machinery for making matches. A communication from Edward Zulzer, of New York, United States of America.

420. Adam Dixon, of Smethwick, Stafford, engineer. Improvements in timber scaffolding or stageing.

422. William Gossage, of Widnes, Lancaster. Improvements in the manufacture of certain alkaline carbonates, and in the useful application of such carbonates.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

460. Frederick William Alexander de Fabeck, of Norfolk-street, Strand, Middlesex. The construction of bridges, viaducts, lintels, beams, girders, and other horizontal structures and supports. February 25.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," March 7th, 1854.)

2275. Henry John Betjemann. Improvements in apparatus for fixing capsules on the necks of bottles and other vessels.
2296. Joseph Porter. Improvements in machines for drilling or boring metals or other substances.
2299. Thomas Lambert. Improvements in ships' waterclosets.
2336. John Francis Porter. Improvements in the moulding of bricks and other articles of like materials.
2343. Edme Jules Maumené. Improvements in the treatment of lignite, or wood-coal, and in obtaining various useful products therefrom.
2344. Robert William Waithman. Improvements in apparatus for applying paint, varnish, and other liquid substances, and also for cleaning carriages, ships, roadways, houses, and other buildings.
2369. William Palmer. Certain improvements in ventilating.
2416. William Watt. Improvements in the preparation of flax and other fibrous substances.
2428. Jonathan Woofenden. Improvements in power-looms for weaving.
2461. Joseph Beasley, Junior. Improvements in the construction and arrangement of puddling furnaces, which improvements are also applicable to other furnaces used in the generation of steam.
2485. Thomas Dawson. An improved case or cover for umbrellas, which can also be worn as a garment.
2509. Edward Gregson Banner. Improvements in obtaining and applying motive power.
2536. Edwin Dalton Smith. A new buffer break for railway-carriages.
2558. James Scott. An improved apparatus for shifting carriages, wagons, engines, and other vehicles on railways and tramways.
2898. Edward Beanes. Improvements in the manufacture and refining of sugar.
17. Julian Bernard. Improvements in the manufacture of boots and shoes, part of such improvements being applicable to the manufacture of garments.
53. William Brown. Improvements in preparing to be spun wool and other fibrous material.
55. The Reverend William Renwick Bowditch. Improvements in economising fuel, and in the more economical production of light and heat.
135. Charles William Rowley Rickard. Improvements in cocks and taps.
216. William Garnett Taylor. Improvements in certain parts of machines employed for preparing and spinning cotton, wool, hair, silk, flax, and other fibrous substances or materials.
231. Arnold Morel Fatio and François Verdeil. Improvements in preserving animal and vegetable substances.
257. James Hargreaves and James Fletcher. Certain improvements in machinery for preparing to be spun cotton and other fibrous materials.
262. Henry Watson. Improvements in the working of brass and copper into forms, and planishing them.
295. John Elce. Certain improvements in machinery for spinning cotton and other fibrous materials.
319. John Taggart. An improved machine for excavating earth.
323. Samuel Hunt and Thomas Morris. Improvements in covering the roofs of buildings with slates, tiles, or other material.
328. Henry Warner, Joseph Haywood, and William Cross. Improvements in knitting machinery.
330. Henry Bridges. Improvements in buffers for railway-carriages or wagons.
331. James Mitchell. Improvements in forcing or distributing liquids.
347. James Cox. Improvements in knives for cutting paper and other materials.
350. John Greenwood. Certain improvements in dyeing textile materials or fabrics.
354. William Sealing. Improvements in machinery for cutting and ornamenting skeins to be used in the manufacture of baskets and other wicker-work.
356. Charles Augustus Holm. Improvements in propelling.
357. Thomas Irving. Improvements in obtaining a metallic and lustry appearance to fabrics and yarns.
369. George Fergusson Wilson. Improvements in preparing an oil, and in the manufacture of candles and night-lights.
377. George Fergusson Wilson. An improvement in the manufacture of lubricating matters.
388. Moses Poole. Improvements in boiler-furnaces and other furnaces. A communication.
390. William Morrison. Improvements in railway-wheels.
393. Edward Loysel. Improvements in apparatus for obtaining infusions or extracts from various substances.
416. Ernst Gessner. Improvements in gig-mills.
460. Frederick William Alexander de Fabeck. The construction of bridges, viaducts, lintels, beams, girders, and other horizontal structures and supports.

WEEKLY LIST OF PATENTS.

Sealed March 2, 1854.

2031. James Pigott Pritchett.

Sealed March 3, 1854.

2177. Henry Walker.
2512. Perceval Moses Parsons.
2671. Robert Griffiths.
2961. John Webster.

1854.

1. Charles Hastings Collette.

Sealed March 6, 1854.

1299. John Box.
2048. Lemuel Wellman Wright.
2051. Henry Wilkinson.
2053. Thomas Pope and Edward Bufton.
2054. Alfred Sommerville and Charles Twigg.
2055. Isaac Smith and Alfred Sommerville.
2056. Joseph Alsop and Edward Fairburn.
2058. David Law and John Inglis.
2062. Benjamin Hustwayte and Richard John Paul Gibson.
2072. Jonas Radford.
2116. Henry Dubs.
2306. Henry Dubs.
2616. Henry Kilshaw and Richard Hacking.

2624. Henry Kilshaw and Richard Hacking.
3041. Adolphus Oppenheimer.

Sealed March 8, 1854.

2068. James Coate.
2080. Charles Askew.
2086. Alfred Vincent Newton.
2092. John Grist.
2103. William Weild.
2104. John Wright Child and Robert Wilson.
2112. Charles Cannon.
2132. James Higgin.
2142. Thomas Browning.
2155. William Carron.
2182. William Stockil.
2193. Edward Oldfield.
2196. Samuel Alexander Benetfink.
2222. John Henry Johnson.
2253. Michael Dwyer and James Brown.
2436. Pierre Marie Fouque, Louis Réné Hébert, and Vincent Etienne Doret le Marneur.
2803. Henry Deacon and Edmond Leyland.
2827. Edward Lavender.
2859. Pierre Marie Fouque, Louis Réné Hébert, and Vincent Etienne Doret le Marneur.

1854.

7. Peter Armand Lecomte de Fontainemoreau.
86. Robert Maclaren.
110. Robert Maclaren.
128. Alexander Dalgety.

NOTICES TO CORRESPONDENTS.

H. Z. writes—"Having a registered article, can I patent any part or parts of the same before or at the expiration of the term of registration, the invention being entirely my own, and having never been used by any other person." A patent might be obtained under the circumstances, but it would be legally invalid.

J. Trestrail and *J. Foss.*—Yours are received with thanks.

G. Shepherd, C.E.—We shall shortly publish an article showing that you are in error as to the identity of the two inventions.

T.—The work most likely to suit you is published for 2s., in Mr. Weale's Rudimentary Series. Its title is—"Marine Engines, and on the Screw, &c."

W. A. W., Widnes.—We are obliged to you for your suggestions. The omission shall be attended to.

A., of Rugby.—Yours will be inserted.

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TIZARD'S PATENT QUARTZ-CRUSHER AND AMALGAMATOR.

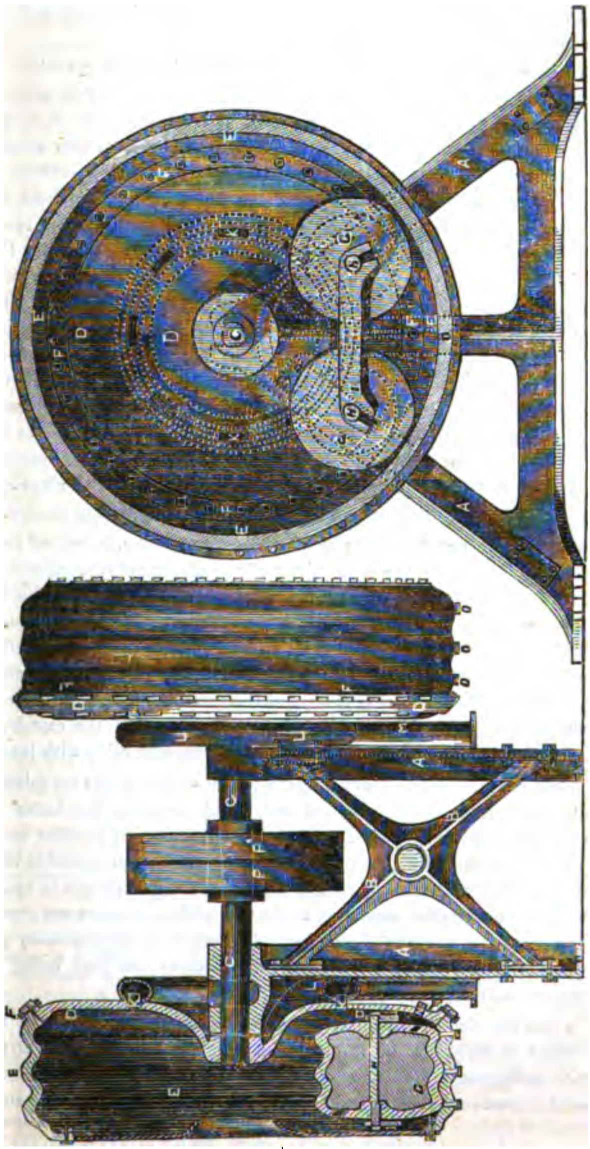


Fig. 2.

Fig. 1.

TIZARD'S PATENT QUARTZ-CRUSHER AND AMALGAMATOR.

(Patent dated January 10, 1854.)

THE numerous machines already in use for crushing and amalgamating auriferous and other ores are by no means so perfect as to preclude further improvements in such apparatus. The more important of the existing machines have been described at length in our pages, and we have now to introduce another, which, from its simplicity and efficacy, promises to become their formidable rival.

The engravings on the preceding page represent Mr. Tizard's machine. Fig. 1 is a front elevation partly in section, and fig. 2 a side elevation also partly in section. A A are iron standards securely bolted to cross stays, B B, and forming with them a permanent frame, which supports the wrought-iron shaft, C. On each end of this shaft is keyed a hollow cylindrical ring, D, fitted with a corrugated sole or wearing surface, E, which is flanged at the edge, and connected to the other parts of the ring by means of bolts and nuts, F F, so as to admit of the ring being divided, and to facilitate the removal of the worn sole, and its replacement by a new one when necessary. In each ring, D, are placed two corrugated rollers or balls, G G, which are loosely connected by means of their axles, H H, and the wrought-iron links, I I, the axles being placed eccentrically. The exit-holes for tailings are at K K, and all waste is received and conveyed away by a circular copper tube, L L, open on one side, and having a pipe, M, in its lower part fastened to the standards, A A. The water-plugs are shown at N, and the holes for drawing off the mercury at O O. The shaft, C, is furnished with fast and loose pulleys, P, P^1, by means of which it can be driven, or its motion destroyed at pleasure. When the shaft, C, is set in motion by a belt passed round the fast pulley, P, the hollow-rings, D D, revolve, imparting rotary motion to the rollers, G G, in a direction contrary to that in which the rings move, and at the same time giving these rollers a compound twisting and oscillating motion.

This complicated motion of the rollers in Mr. Tizard's machine, is derived from the horizontal position of the main axis, the eccentricity of one of the axles in each roller, and the coupling of the rollers together by a connecting-rod on each side, and is peculiarly favourable to the rapid reduction of the materials to be pulverized. In this respect, his is undoubtedly superior to the machines hitherto in use, in which the crushing effects arising from *weight* only are all that are obtained. The corrugations of the rollers and rings are also adapted to increase the producing powers of the machine, in consequence of the large amount of pulverizing surfaces they present, while the pressure of the cast-iron rollers is greatly augmented by their being cast hollow, and subsequently filled with lead.

The use of distinct water and mercury plugs is introduced into this machine in order to facilitate the removal from the ring of the water and mercury, the latter of which is received into an iron safe containing a straining apparatus, which, after extracting the gold from it, allows it to pass away, the gold thus extracted being deposited in the interior of the safe, where it may be kept securely locked until it is thought proper to remove it. By this arrangement the facilities for peculation on the part of the operatives are greatly reduced, and safety is insured to the owner of the quartz. The machine itself is easily portable, the ring being formed in three parts, and the rollers cast hollow, the lead being poured into the latter when they have arrived at their destination.

Mr. Tizard's mill has also the advantage of being unattended by a loss of the mercury and gold. Neither of these can be thrown over with the tailings by centrifugal force, since the waste is permitted to flow away at a point of the machine at which the speed is the least, while the metals are kept in contact with and under the pulverizing surfaces of the rollers.

PHENOMENA OF ROTATORY MOTION.

(The Substance of a Lecture delivered at the Royal Institution, by the Rev. Baden Powell, M.A., V.P.R.S., F.R.A.S., &c., &c.)

THE mechanical principle of "the Composition of Rotatory Motion," originally discovered by Frisi about 1750 (see Frisius de Rotatione, Op. ii. 134, 157, and Cosmographia, ii. 24) is equally simple in its nature, important and fertile in its consequences and applications, and susceptible of the easiest explanation and experimental illustration; yet it has been singularly lost sight of in the common elementary treatises. It is indeed discussed and applied in a mathematical form in Mr. Airy's Tract on Precession (Math. Tracts, p. 192, 2nd edition): and the theorem is stated by Professor Playfair in his "Outlines of Natural Philosophy" (i. 144), and its application explained (ib. ii. 308). These, however, are not books of a popular kind, and the author is not aware of any mention of it in other English works. In a more abstract analytical form it has been discussed by several foreign mathematicians, especially by Poinsot, in a memoir read to the Academy of Sciences, May 19, 1834, but of which only an abstract was published; as well as by Poisson, in a paper in the Journal de l'Ecole Polytechnique (xvi. 247).

The principle is involved in the explanation of several important phenomena, some of which are, in fact, mere direct instances of it; so that a simple experimental mode of exhibiting it would be eminently desirable; and several such have accordingly been devised which yet seem to have been but little generally known.

An ingenious instrument of the kind was contrived some years ago by Mr. H. Atkinson, a very brief account of which is given in the Astronomical Society's Notices, vol. i., p. 43, though so brief that it is difficult to collect what the precise mode of its action was; but it seems somewhat complex.

A far more complete and instructive apparatus was invented by Bonenberger, and described in Gilbert's Annalen (lx. p. 60). It is also explained in some German elementary works. Attention has been more recently drawn to the subject by a highly interesting paper of Professor Magnus, of Berlin (Verhandlungen der Konigl. Preuss. Akad. 1852, translated in Taylor's Foreign Scientific Memoirs, N. S., Part III., p. 210), in which some remarkable applications of this apparatus are given: he also describes it (with a figure), and observes that the execution of it requires great delicacy and correctness of workmanship. Copies of this instrument have indeed been made in this country (one of which was exhibited through the kindness of Professor Wheatstone); but of these the author believes no description has ever appeared in English works, and they are certainly very little known, notwithstanding their manifest value to every lecturer: the essential parts are a sphere capable of rotating about an axis whose extremities rest in opposite points of a hoop which can turn on pivots *horizontally*, within another hoop turning on pivots about a *vertical* line.

In fact, the author of the present communication has long felt the want of such an apparatus for lecture illustration; and before he was aware of the existence of any of those just alluded to, had constructed one in a different form, and which is found to answer fully the purposes of illustration for which it is designed, without any nice workmanship or complex machinery. (See Astronomical Society's Notices, vol. xiii., p. 221-248.)

Its object, like that of the instrument last mentioned, is to exhibit experimentally *the actual composition of rotations about two different axes impressed at once on the same body.*

The essential parts are merely a bar capable of rotating freely about one end of an axis (and loaded at its extremities to keep up the rotation), while the axis itself can turn about a point in its length near the end carrying the bar, upon a horizontal axis capable of moving freely round a vertical pillar. At the lower end of the first axis is a weight which more than counterpoises the upper part.

If, then, there be no rotation in the bar about the first axis, the effect of the weight is to produce a rotation about the second alone, bringing down the first axis into a vertical position.

If now the first axis be held horizontally or obliquely, and a rotatory motion be given to the bar about it, on letting the axis go, *we compound both rotations;* and the resulting effect is, that the weight will no longer bring the axis *down*, or alter its *inclination* at all, but will cause it to take a new position, or make the whole to turn round the vertical, in a direction *opposite* to that of the rotation.

Thus, although confessedly not new in principle, to make public an experimental illustration in so simple a form, may not be without its use for a great majority of students.

Even the theoretical principle is capable of being stated in a way quite intelligible to those acquainted only with the very first rudiments of theoretical mechanics, presenting itself in close *analogy* to that well-known first principle, the composition of *rectilinear* motion.

As in this last case, if a body be in motion in one direction, and any cause tend to make it move in another, it will move in neither, but in an intermediate direction—so we have the strictly analogous case in *rotatory* motion; *when a body is rotating about an axis, and any cause tends to make it rotate about another axis, it will not rotate about either, but about a new axis intermediate to the two.* Thus the result of compounding the two rotations will be, that the axis (carrying with it the rotating body) will simply take a new position, or will move in a direction determined by the nature of the impressed motions.

Professor Magnus, in the very able, but rather prolix and obscurely written memoir, before referred to, speaks (p. 223) of the consequences of such a law as evinced in the resulting rotations, but without any distinct or explicit statement of the essential theorem of the composition of rotatory motion. He gives, however, some singular and even paradoxical exemplifications of it. We may allude to one of these, which is capable of being put into a form at once *more simple*, and at the same time *more paradoxical*, than that in which he describes it. It consists in this: a wheel at one end of an axis, and a weight at the other, are suspended in equilibrio; which is, of course, unaltered, whether the wheel be at rest or in rotation: the weight is then slid so that the balance is *destroyed: now* if the wheel be set in rapid *rotation*, the *equilibrium is restored.* This is nothing but a simple case of the principle just stated, as shown by the author's apparatus.

Besides certain other cases traceable to a different cause, Professor Magnus's immediate object is to explain a curious observed anomaly in the motion of projectiles of an *elongated* form shot from *rifled* guns, and which consequently *rotate* about their axis, while passing through the air in the direction of that axis.

He mentions the fact that artillery experiments in different countries with rifled cannon and missiles of a cylindrical form with a conical apex, *always show a deviation of the point of the missile to the right, the rifle-spiral being right-handed.*

To explain the nature of this deviation was the object of special experiments on the part of the Prussian Artillery Commission, in which Professor Magnus assisted. The missiles were fired with low charges, so as to allow the motion to be accurately observed, and it was found that the axis remained sensibly in the direction of the tangent to the curved path, while the deviation to the right was always clearly marked. He observes that left-handed rifles have never been tried.

Professor Magnus, after some fruitless conjectures as to the cause, at length sought it in the principle of *the composition of rotatory motion.* He tried experimentally the effect of a current of air on a projectile of the form employed, by inserting such a body instead of the rotating sphere in Bonenberger's apparatus, and observing the effect on it, first at rest, and then in rotation, when the strong current of a blowing machine was directed against the conical apex. When at *rest*, the current *elevated* the apex; owing to the form of the missile the resistance acting not through the centre of gravity, but above it: when in *rotation* no *elevation* took place, but a *deviation* in the direction of the axis, in a direction opposite to that of rotation. To show the application of the principle in this case, he observes that the axis of the elongated projectile, which for an instant coincides with the *tangent* to its curved path, momentarily changes its direction, so that the front extremity or apex falls below its former position. Or, for a single instant it may be regarded as if locally at rest, but turning about its centre of gravity so as to depress the apex.

If the motion were simply in the direction of the axis, the *resistance of the air* would operate directly against it; but when the apex is continually tending to turn *downwards* from that line, the resistance acts against it partially *upwards*, and thus tends to raise the apex.

Thus, at a given instant, the elongated projectile may be represented by the rotating part of the apparatus just described.

When there is *no rotation*, the resistance of the air tending to raise the apex is represented by the weight at the lower end, which produces the same effect.

When a rapid *rotation* is communicated (suppose from left to right of the gunner), the result will be, *no elevation of the apex*, but a *lateral* movement, or commencement of a rotation round the vertical—in astronomical language *retrograde*, if the former rotation be *direct*—but which beginning from the opposite part of the circle is, *relative to the operator*, towards the *right.*

The form of the projectile used in these experiments differs from that in the Minié rifle in that the latter is hollow at its broader end, and thus the centre of gravity is thrown forward towards the apex. Hence, according to the same theory, the effect would probably here be to depress the apex, and therefore to give an opposite deviation: but it does not appear whether any such observations have been made; and in practice the effect would probably be quite insensible.

It occurred to the author that a very

simple illustration of this deviation of rifle projectiles might be made by merely forming a sort of small arrow, whose head was composed of a cork, like a shuttlecock, but instead of the feathers, small card vanes inclined in the same direction round it, with a tail to balance it, and which thus in the mere act of throwing acquires a rotatory motion from the reaction of the air, to the right or left according as the vanes are inclined; and on trying this there was always observed a deviation in the direction of the axis or point of the missile to the right or left accordingly, relative to the experimenter. It is, in fact, nearly impossible to throw such a body in a direction perfectly in one plane. The true deviation is, however, peculiarly liable to be disguised by the general resistance of the air on so light a missile, as well as by currents, &c., which is not easy to guard against.

The well-known case of the *Boomerang* exhibits effects closely similar; for it is found that if so projected that its *rotation* is from left to right, its *deviation* will be in the *same direction*, and *vice versâ:* that is, supposing (as is the usual case) that its plane is inclined *upwards* from the operator:—if it be inclined *downwards*, the deviation is in the direction *opposite* to that of the rotation.

In the former case, the reaction of the air against the flat surface of the missile, would tend to increase its inclination *upwards*, in the latter *downwards*, with respect to the operator: and this in each case respectively would give the motion stated; as is easily seen on the principle, and by means of the apparatus, before described.

Thus it would follow, that this extraordinary instance of savage invention, which long ago puzzled inquirers, is simply a case (like the last) of "the composition of rotatory motion."

It should, however, be mentioned, that some experimentalists have entertained a different view of the cause of deviation in this instance.

Besides the results above stated, Professor Magnus (in the same Memoir) mentions several other highly curious cases produced by certain modifications of the apparatus; but all referrible to the same principles.

M. Fessel has also invented an apparatus (since called the Gyroscope), an account of which is given, with some remarks by Professor Plücker and the Editor, in Poggendorff's "Annalen" (1853, Nos. 9 and 10), which, though apparently invented without any knowledge of Bonenberger's apparatus, is a modification of it, referring to phenomena of the same kind as those of the equilibrium experiment mentioned at first.

This apparatus has been greatly improved upon by Professor Wheatstone, who has introduced other movements to include the conditions of rotation in different planes. One of these instruments was exhibited.

From these singular applications of a very simple mechanical truth, we may now turn to what is but another exemplification of the same thing, however apparently remote from those we have considered, and upon a far grander scale.

The phenomenon of the precession of equinoxes was known to Hipparchus; but no explanation of the fact was for ages imagined. Even Kepler, in the multiplicity of his hypothetical resources, could not succeed in devising anything plausible. The axis of the earth is slowly shifting its position, so that its pole points continually to a new part of the heavens—a new pole star—at the rate of about 50″ a year, and of course carries with it the point of intersection of the earth's equator with the ecliptic or plane of its orbit, at the same rate and in a direction opposite to that of its motion, or the order of the signs.

These phenomena remained wholly without explanation till Newton, led by the analogy of those disturbing forces on the orbit of a planet which cause its *nodes to regress*, showed that the same would occur in a *satellite* to the earth—in a *ring* of such satellites—in such a ring adhering to the equator, or the protuberant part of the terrestrial sphere; and thus that the equinoctial points would slowly regress. (See Principia, i. 66, Corr. 11—22.)

The more exact determination of quantitative results was reserved for Newton's successors, when a more powerful analysis had been applied by Euler, D'Alembert, and others, to the full exposition of the theory, founded on general equations of motion; as since given in the writings of Laplace (Mec. Cel. liv. xiv. ch. 1) and Pontécoulant (Théorie du Système du Monde, liv. iv. ch. 5), which are necessary for including all the minuter variations detected by Bradley and subsequent observers, showing the *nutation* of the axis, and the inequalities of precession due to the varying configurations of the attracting luminaries.

These higher mathematical views, though of course the most complete and systematic, are not the most direct or easy mode of explaining the subject to the student. Greater simplicity certainly characterizes the method adopted by Mr. Airy (in the tract before cited) of applying *directly* the theorem of the composition of rotatory motion, as, doubtless, Newton would have done, had it been known to him. But here, as in so many other instances, the first explanation presented itself mixed up with more complex considerations; and as has been well

observed, "simplicity is not always a fruit of the first growth."

To those not versed in the mathematical theory of all points in Physical Astronomy, the *modus operandi* of the precession, perhaps, usually seems the most paradoxical, and the explanations given in some of the best popular treatises are seldom found satisfactory, following as they do the letter of Newton's illustration, and omitting the *direct* introduction of the principle of composition, which, if only from what has been here offered, is at once seen to be easily capable of the most elementary explanation. Indeed it was from this consideration forcing itself on the mind of the author, in several courses of popular lectures on astronomy, that he was led to seek the means of experimental illustration above described; and which would more palpably imitate the phenomena to the eye, if, instead of the rotating *bar*, a terrestrial *globe* be substituted (as in Bonenberger's instrument)—for better illustration made protuberant at the equator—where the weight at the south pole acts the part of the sun's and moon's attraction, to pull down the protuberant matter of the spheroid at the equator, if at *rest*, but when combined with the earth's *rotation*, results in a transference of the position of its axis, or slow revolution of its pole round the pole of the ecliptic in a direction opposite to its rotation, carrying with it the equinoxial points, and causing the *signs* of the zodiac to shift backwards from their respective *constellations*.

It always affords a sort of intellectual surprise, to perceive for the first time the application of some simple and familiar mechanical principle to the grand phenomena of astronomy; to see that it is but one and the same set of laws which governs the motions of matter on the earth and in the most distant regions of the heavens; to find the revolution of the apsides in a pendulum vibrating in ellipses, or the conservation of areas in a ball whirled round by a string suddenly shortened; or (as in the present case) to perceive a celestial phenomenon, vast in its relations both to time and space, and complex in its conditions, identified, as to its mechanical cause, with the rotatory movement of a little apparatus on the table before us,—or to discover the precession of equinoxes in the deviation of a rifle or a boomerang. And the simple experimental elucidation of such phenomena and their laws will not be useless, as it tends to confirm in the mind of the student the great characteristic of the modern physical philosophy first asserted by Galileo, the identity of the causes of the celestial and terrestrial motions, and to aid and elevate our conception of those grand and simple principles according to which the whole machinery of the universe is so profoundly adjusted.

SUPPLEMENTARY VALVE FOR CORNISH ENGINES.

THE following letter on Birkinbine's patent valve has been addressed to the *Journal of the Franklin Institute* by H. Howson, Esq.

I beg to call your attention to the accompanying sketch of a supplementary valve apparatus for Cornish engines, for which a patent was granted to Mr. Birkinbine, of this city, in November last. The invention, though simple in itself, is likely to prove of considerable importance in connection with a class of steam engines, the merits of which have as yet been scarcely appreciated in this country, but which are now beginning to attract the attention of engineers, and will, without doubt, be eventually adopted in preference to all other hydraulic machinery for mining purposes, water-works, &c.

The Cornish engine, so called from its universal adoption in the mining districts of Cornwall, England, is single acting, the pressure of the steam acting on one side of the piston only, thereby raising the plunger and any requisite additional weights. The steam thus used in raising the plunger is afterwards admitted to the opposite side of the piston, and thus equalizing the pressure on both sides, the weighted plunger descends and forces the water to the required height, completing one stroke of the engine. The steam contained in the cylinder is on the commencing of another lift of the plunger carried off through the exhaust pipe to the condenser.

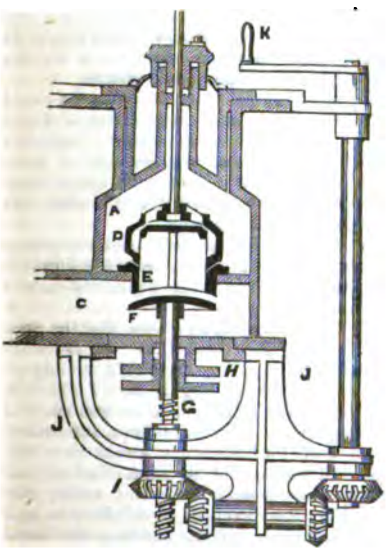
The several evolutions of the engine are effected by four valves; first, the regulator, through which is admitted the steam in the first instance, and whose movements are regulated by hand only; secondly, the steam valve which admits steam to the cylinder; thirdly, the equilibrium valve, by means of which the pressure on both sides of the piston is balanced; and, fourthly, the exhaust valve through which the steam is carried off to the condenser.

These valves are actuated by tappets on a plug rod, which moves simultaneously with the piston, in conjunction with weighted levers, and the ingenious and well known cataract motion, the tappets serving to close, and the weighted levers (whose action is dependent on the cataract) to open the several valves. These are contained each in separate compartments of a chest or nozzle,

communicating with each other and with the cylinder.

The required volume of steam is, in the first instance, admitted through the regulator valve into the compartment occupied by the steam valve, on the opening of which, by a weighted lever released by the cataract, the steam is admitted to the cylinder, thereby raising the plunger to the required height. In another compartment, which communicates with the passage through which steam was admitted to the cylinder, is situated the equilibrium valve, on the raising of which, the steam in the cylinder which has performed its duty of raising the plunger, passes into the space, C, and thence through a pipe or passage to the opposite side of the piston, thus allowing the plunger to descend. The space, C, communicates with the chamber of the exhaust valve, as well as with the equilibrium passage; the exhaust valve is, however, closed as long as the equilibrium valve is open, and is not again brought into action until the engine is prepared to commence a new stroke.

The accompanying sketch represents a sectional view of that portion of the valve nozzle only which contains the equilibrium valve, which will no doubt be sufficient, with the foregoing brief explanation, to render Mr. Birkinbine's patent apparatus familiar to your readers.



It may be here remarked, that all the valves are of the double beat description, so called from having two conical or beating surfaces instead of only one, as in the ordinary stalk valve, and are in principle similar to those used in stationary and marine engines, and denominated balance-valves. D is the equilibrium valve contained in the compartment, A, which communicates with the passage from the steam valve to the cylinder. The seat of the valve, D, is secured to the bottom of the compartment, and has a circular flanch, E, projecting through the opening. This projecting flanch forms the seat for the supplementary valve, F, which is attached to the top of the screwed spindle, G; the latter passes through a stuffing-box in the cover, H, and screws into the hub of the bevel-wheel, I, which runs loosely in the bracket, J; this wheel is caused to revolve, and thus the supplementary valve raised or lowered by the handle, K, and shaft, L, and the additional bevel-wheels.

The object of the invention is to arrest, more or less, as circumstances require, the passage of the steam through the equilibrium valve from one side of the piston to the other, and, consequently, of regulating the descent of the plunger.

The utility of the arrangement will be at once apparent; it obviates the necessity of adopting the old and tedious process of adding and removing heavy weights, while, in case of any breakage, or other accident occurring to the pumps in a mine, the damage likely to occur from sudden shocks is prevented by the facility of adjusting the valve to regulate the descent of the plungers.

It is in Cornish engines, when used for water-works, however, where the utility of this invention may be brought into practice most advantageously, especially in those works where a stand pipe is used to obtain the necessary head of water; in this case the fluctuation in the level of water is necessarily sudden, and of considerable extent, causing a similar variation of load on the engines, and rendering the machinery most unsafe and uncertain in its action.

Should the head of water in the stand pipe be low, the plunger would have a tendency to descend with a dangerous rapidity, which is checked in a moment by turning the handle, K, so as to raise the supplementary valve, F, thereby arresting the steam on its passage from one side of the piston to the other, the plunger consequently descending with a safe and gradual motion.

Should the head of water, on the contrary, be high, the valve, F, is instantly withdrawn from the seat, and a free passage given to the steam, the head of water being in itself sufficient to ensure an easy descent of the plunger.

Although the apparatus is shown in the sketch as regulated by hand, it is proposed

in some instances to allow the variations in the head of the water to be the means of adjustment, an application which might be made by a simple arrangement of machinery.

UNIFORM MEASURES, WEIGHTS, AND COINS.

At the meeting of the Institution of Civil Engineers which took place on the 7th inst., the evening was devoted to the discussion of Mr. Yates' Paper, "On the Advantages of Uniformity in European Weights, Measures, and Coins," a report of which was given in our last Number.

After describing the steps taken to induce the attention of the Legislature to the subject, and reviewing succinctly the evidence of the different witnesses examined before the Select Committee on Decimal Coinage, and the report resulting from that inquiry, the advantages to be anticipated in all matters of money accounts were first dilated on, and then the translation of the present diversified weights and measures into one uniform, and decimally divided, system was insisted on.

It was urged, that great facilities would be introduced in keeping accounts and making calculations; that the pound sterling being adopted as the integer, the whole of the coins in present use might be retained, by only stamping their decimal value upon them, and thus keeping them in circulation until a new decimal coinage could be prepared. The proposed coins were shown to be sufficiently small for the purposes of the poor, for whom the quantities of merchandise would always be adapted to the purchaser's means; and the pound sterling remaining as the integer, was urged to be all that the large bankers and merchants could desire.

It was argued, that there were great objections against endeavouring to assimilate the coins of this country with those of other states; inasmuch as it would be impracticable to get all countries to agree; despotic monarchs would still continue, as heretofore to debase the value of the coinage, to meet the exigencies of the moment, and even republican states had depreciated the value of their money, so that, if all coins were to-day, universally, of the same standard and value, there was nothing to prevent their being all wrong to-morrow. Therefore, all that could be done, was to decimalize the currency of this country, without reference to that of other countries, and it was then thought that, eventually, the same adjustment of weights and measures would follow.

The work of General Sir C. W. Pasley was quoted, to show the inappropriateness of the mètre and its sub-divisions for this country; it was urged, that even in France its use had only been enforced, during the Revolution, by the harshest means, and that even then the *système usuel* (feet and inches) had remained in force for nearly half a century, and in spite of decrees, was even now scarcely abolished. The further propositions made by the General, for a decimal system based on the existing coins, weights, and measures, were carefully examined.

Professor Airy's evidence before the Committee was dilated on, and it was endeavoured to be shown, that any attempt to assimilate English and foreign coinage must fail, if only from the force of public opinion, and the passive resistance of those who had no interest in making any change.

It was a question of immense difficulty, how to establish a natural basis for a standard; it had been in almost all cases found impossible to establish one correctly, and therefore an arbitrary standard had been preferred. The precautions taken for preserving correct types of the standards for England, were detailed. The introduction of the decimal subdivision of the lb. Troy for the use of the Bank of England and the bullion dealers, was quoted as an example of what necessity would do naturally, and was used as an argument to urge civil engineers, architects, and builders, to introduce some uniform scale of decimal measures, to which money values would be brought to assimilate more easily on the decimal, than on any other system.

It was shown that the Government could only "enforce" a decimal division of the coins of the realm, but it might "permit," eventually, such an arrangement of measures and weights as would be found most convenient, by merchants and traders, for the purposes of commerce.

The system of the franc and the penny was strenuously urged, as being the simplest and best adapted for the wants and habits of the labouring classes.

It was contended, by others, that the proposition of the Committee on Decimal Coinage, for adopting the pound sterling as the integer and dividing it into 1,000 mils was untenable; inasmuch as besides unsettling tolls and postage stamps, authorized by Act of Parliament, it would alter the prices of produce of all kinds, and only in a few cases supply equivalent rates; nor would it meet exchanges with France and other countries without dividing the cent. into most inconvenient fractions.

It was therefore urged, that it would be more convenient to adopt a lower integer, proposing either a coin of the value of 25 pence = 100 farthings, or cents, or a coin of

the value of 10 pence=40 farthings, or cents. The latter was considered to be more in harmony with the monies of France, Holland, America, and other countries where the decimal system had been already adopted. The coin of $\frac{4}{10}$ths of a farthing would equal the centime of France. The exchange with other countries would be met within $\frac{1}{8}$th of a cent, and manufacturers would have a denomination to suit the smallest variation in prices, or profits, without using the extreme fractions now resorted to.

If it was admitted that the true arithmetical and scientific division of the integer was into 100 parts, or cents, it was contended that no difficulty would be experienced in the practical introduction of the system into commerce, and into retail trade; that its adoption would lead to a more correct method of estimating profits and losses, and of keeping books, and that it would facilitate calculation, and the receipt and payment of duties, taxes, and monies of all kinds.

As early as the year 1832, Mr. Babbage had, in his "Economy of Manufactures," drawn attention to the decimal system, as being the best adapted for facilitating all mercantile calculations, and had suggested the conversion of the present currency into a decimal series.

It was stated, that at the period of the Great Exhibition in 1851, Monsieur de Vinsac, member of the Academy of Macon (France), was deputed by that society to endeavour to induce the adoption, in this country, of a system of weights, measures, and coins, somewhat analogous to, if not identical with, those of France. That period, however, was not favourable for the consideration of the subject, and Monsieur de Vinsac had left with the Secretary of the Institution of Civil Engineers certain documents, from which should now be culled and translated all that might apply to the question, in order to their publication with Mr. Yates' paper.

RAISING SUNKEN VESSELS.

It is well known to many persons that, in consequence of the inefficiency of the methods at present employed for raising sunken vessels and other property, the wrecks upon our coast are now almost wholly abandoned by the owners. Mr. Trestrail has, however, lately invented a plan for effecting this object, the main feature of which consists in the employment of the buoyant power of gases generated under water.

The gases at present employed by the inventor are produced by the slow combustion of gunpowder mixed with other ingredients, which are previously prepared, and placed in metal caisoons which have at their upper extremities air-tight chambers (for the reception of the combustibles) fitted with valves communicating with the interior of the caisoons, which, being filled with water admitted through valves placed at their lower extremities, are made by their specific gravity to sink and descend to the divers, who secure them to chains or cables passed round the sunken wreck; and, when they are firmly attached thereto, the gas-generating power is set in action by the divers below by a simple detonating process; vulcanized India-rubber bags, connected with retorts, being also, when necessary, placed within the hold and cabins of the sunken ship, and inflated by the means described, to give it still greater buoyancy.

It is clear that when a number of these caisoons, attached to a sunken vessel, have been thus rendered buoyant, they will exert a lifting power in proportion to the quantity of water displaced from within them by the gases produced, and, consequently, when sufficiently buoyant to overcome the specific weight of the sunken vessel and cargo, and also its adhesion to the soil on which it lies, the entire vessel must be raised to the surface of the water, and there sustained.

The following advantages result from this arrangement:—

That which generates the lifting power is prepared on shore, and kept in constant readiness for use; it is placed within the caisoons or retorts, and set in action, when required, by the diver, without communication with the surface. The volume of gas, and consequent lifting power, can be increased *ad infinitum*: the lifting power is exerted more equally on all parts of the chains, or sunken vessel, than by the ordinary methods, and the wreck, when raised to the surface of the water, is kept afloat, and can be readily towed into harbour by another vessel.

This invention contemplates also the prevention of ships from sinking. For this purpose it is intended to place under the deck-beams, and other parts of vessels, vulcanized India-rubber bags, rolled and confined within suitable boxes. When the vessel, from any cause, is in danger of sinking, the bags are to be liberated from their boxes, and inflated by means of gas-generators communicating with them, care being taken to render the deck sufficiently strong to bear the upward pressure.

ASCENSION IN BALLOONS.

To the Editor of the Mechanics' Magazine.

Sir,—In answer to the letter of your correspondent, "A.," in No. 1596, permit me to say that I can by no means admit that no error has been made "in imagining that the balloon may, in this way, be relieved of a portion of the weight in question." I have a further statement to make which I neglected to insert in my former letter on this subject; a statement, perhaps, less in accordance with the prejudices of "A." than anything I have before said on this matter. It is, that so far from affording any facility to the ascent of the balloon, such a motion being given to the weight will absolutely cause the balloon to *descend*, if otherwise it would remain in equilibrium; and would to a certain extent *retard its ascent*, if ascending; and in such a way that the common centre of gravity of the balloon and weight would remain at rest, or preserve the same rate of motion as it would have if the said weight were hanging vertically. My solution of the problem of "Senex" is, I think, a correct and logical deduction from the elementary principles of mechanics, the parallelogram of forces, the laws of motion, and D'Alembert's principles, all of which I assume to be true; and therefore conclude that every one of "A.'s" propositions is incorrect; and that his "experience" has most certainly led him wrong, and will no doubt do so continually, if he is not very careful. If his experience has been such as to lead him to believe that there is a certain discoverable velocity, at which, if his system of two weights at the opposite extremities of the bar at AP, be revolving, it will have no downward tendency, and would, if disconnected from the balloon while in motion, retain its situation in mid-air till called for—say on the return of the balloon—let him trust his experience no more; she has proved herself a dangerous guide.

The equation

$$P.CP = W.'CF$$

looks like an equation of moments; if it be intended as such, it is a very absurd one. It seems that "A." assumes that the system will always be in equilibrium about C; in that case the equation of moments, correctly taken, would be, if F = tension of string,

$$P.CP = T.AC. \sin. \angle FAW'$$

$$\text{or} \quad T \sin. \angle FAW' = W,$$

proving that the resolved vertical portion of the tension is always constant, and equal to the weight. Let "A." read the first chapter of any book on mechanics, and I am confident he will perceive the truth of these remarks.

The dissertation on centrifugal force unfortunately proves that its author does not very well know what centrifugal force is; nor that its direction is always that of the radius of curvature of the curve in which the body moves, and that its amount is measured by the square of the velocity divided by the radius of curvature. If any of these fundamental propositions of mechanics, on the untruth of which "A." must found his principles, have ever been disproved, I have never heard of the fact.

I will here give the equations of motion modified to suit the present case, observing that they do not apply while the weight is ascending, but when it has ascended.

Let $CP = a$, the rest as in the former problem.

$$\text{Then} \quad W = T \sin. \theta,$$

$$\frac{W}{g} \cdot \frac{v^2}{a + l \cos. \theta} = T. \cos. \theta,$$

$$\frac{g(a + l \cos. \theta)}{v^2} = \tan. \theta,$$

$$a + l \cos. \theta = \frac{v^2}{g} \tan. \theta.$$

An equation not so readily solved in its general form as that obtained in the former case. J. C.

Deptford, March 13, 1854.

LIPSCOMBE'S IMPROVEMENTS IN SHIP-BUILDING.

To the Editor of the Mechanics' Magazine.

Sir,—I am sure that I shall best consult the interest of your readers by declining to pursue the controversy with Mr. Lipscombe. No good can result from letters on scientific subjects, in which the commonest mathematical knowledge is wanting, and dogmatism takes the place of argument.

Allow me to say, for the benefit of Mr. Lipscombe and his nautical friends, that two models of the *America* were made some time since, and that that part of the hull of one of them which was below the water was reversed; sail was set upon them, and it was found that, although the one with the reversed hull fell off from the wind, she went through the water with greater velocity than the other. I would also say that the *Raleigh*, one of the best frigates in the Navy, has by far the fullest bow of any.

I am quite prepared to give proofs of

these facts to any person who may desire it, and accordingly send you my card.

N. B.

To the Editor of the Mechanics' Magazine.

SIR,—I do not intend to enter into the main controversy between Mr. Lipscombe and "N. B." I will leave the latter to conduct his own case, which he can evidently very well do without extraneous aid.

However, in his letter inserted in your last week's Number, Mr. Lipscombe endeavours to show that "the result of his experiments is in complete accordance with sound science." This he may have established to the satisfaction of himself and others who have a smattering of science; but in his long explanation, he has introduced a fallacy, which vitiates the whole of his argument. That fallacy is, that the pressure of the fluid on the inclined plane, D (*vide* page 217), is the same as that on the vertical plane, B. The fact is, that according to the usually received doctrine of resistances, the whole pressure on D, is the equal to the product of the direct pressure on B, and the sine of the angle between A and D.

If, therefore, P be the pressure on D, and P^1, the pressure on B, $P = P^1$, sin. θ, where θ is the angle between A and D.

A further error which Mr. Lipscombe makes is, that the *resultant* of two pressures acting at right angles to one another is equal to *their sum*, whereas it is the square root of the sum of their squares. Suppose, therefore, P to be the pressure on D: the component in the direction of A is P sin. θ. Hence, on the whole, the resultant horizontal pressure on D is $= P^1 \sin.^2 \theta$. If $P^1 = 8,000$ lbs. and $\theta = 45°$, then this pressure $= 4,000$ lbs.; which happens to agree with Mr. Lipscombe's result, by a compensation of the two errors he commits.

For any other angle his results are quite incorrect. Suppose, for instance, the length is n times the depth, then evidently

$\sin.^2 \theta = \dfrac{1}{n^2+1}$ and the resolved horizontal pressure on the inclined plane $= \dfrac{P^1}{n^2+1}$:

if therefore n be 2 or 4, this pressure will be 1,600 lbs. and $470\frac{10}{17}$ lbs. respectively, differing essentially from the numbers he gives, viz., 2,000 lbs. and 1,000 lbs. It is true the ordinary theory of resistances is known to be incorrect, but we have no evidence whatever that that which Mr. Lispscombe desires to substitute for it is more accurate, except his bare word. And if his "science" be "sound," it would be advisable to expound its principles, which must, as I have shown, differ materially from those now universally adopted.

That I may not lay myself open to the imputation of making assertions without proof, I will state briefly the steps by which my results are obtained.

Let v be the velocity with which B, moving directly, experiences; the resistance P^1; and $P^1 = c\,A\,v^2$; where c is a constant, and A the area of B: then v sin. θ is the relative velocity of the plane D, and the stream in a direction perpendicular to D; and the whole pressure on $D = c\,D\,v^2$. $\sin.^2 \theta$; but D (area of D) $= \dfrac{A}{\sin.\theta}$ $\therefore$ whole pressure on $D = c\,A\,v^2 \sin \theta$, and the resolved part of this in the direction of motion $= c\,A\,v^2 \sin.^2 \theta = P^1 \sin.^2 \theta$.

I shall not enter further into this question, nor examine the fairness of his comparison between his own model boat and ships with bows of ordinary form as regards capacity for beam. I have said enough to show that the figures of Mr. Lipscombe are not to be relied on.

I am, Sir, yours, &c.,

A CONSTANT READER.

London, March 13, 1854.

ON THE COLOURS OF STARS.

To the Editor of the Mechanics' Magazine.

SIR,—The difference in tone of a steam-whistle, as it rapidly approaches and recedes from the listener, has been frequently observed; the fact was, I believe, first alluded to by J. S. Russell, and brought by him before the notice of the British Association. The variation in pitch is obviously dependent on the ratio which the velocity of the engine bears to the speed with which sound is propagated through air; and the effect is, of course, more distinctly perceived when the observer is placed on an engine passing the first, a greater number of vibrations being conveyed to him while advancing towards, and a less number when receding from, the sounding body, than would result were both the observer and the whistle stationary. The note therefore appears, when approaching, higher, when receding, lower than it does to the driver producing it. Similar disturbances appear to exist in sensations produced by undulatory motion propagated through any medium, and therefore to *light*; and although the periodic action, of which this last principle is a manifestation, be transmitted with immense

velocity, yet as the number of vibrations in a given time is vast, to a corresponding extent, I think no incredible velocity in a celestial body would be required to illustrate the change produced thereby; while in fact any motion, however slight, of bodies either celestial or terrestrial, will alter their appearance, although to an extent so minute as to be quite inappreciable by our imperfect organs. As differences in pitch or note, and differences in colour are alike due to different rates of vibration in the media affected by sound and light respectively, it may be anticipated that the mere motion of a sounding or coloured body would produce analogous modifications in each case. It is known that while the velocity of propagation is the same for luminous rays of different colours, the number of vibrations per second varies with each from 449 billions for red to 786 billions for violet rays; and we may assume the relative number of vibrations by the intermediate rays of the solar spectrum to be represented by the numbers in column No. 1 of the following Tables (I have not the means at present of ascertaining the exact amounts):

	I.	II.	III.
Red	449	524	374
Orange	490	572	408
Yellow	540	630	450
Green	587	685	489
Blue	650	768	541
Indigo	720	840	600
Violet	786	917	655

Now, suppose a body sensitive to luminous impressions moving towards a point emitting such rays, at the rate say of 32,000 miles per second, that is, one-sixth of the velocity of light, the relative number of vibrations it will meet in a given time will then be represented by the numbers in No. 2 column, and No. 3 gives the vibrations transmitted to it when receding at the same speed.

It will be seen, from an inspection of these numbers, that in the first case the red and orange colours disappear from the spectrum, or rather the increased number of vibrations communicated by them impart a yellow and green colour; and, in the latter case, for similar reasons, the indigo and violet colours disappear. It is possible, however, that the non-luminous rays at either extremity of the spectrum exist *in sufficient quantity* to occupy the place of the rays displaced by the motion; but if not, the luminous centre must appear in each case of a tint in part complementary to the other. Such appearances, if existing in nature, could only be exhibited by the *suns* of celestial systems, and the existence in binary systems of stars of bodies emitting different and generally complementarily coloured rays has been long ascertained. Were these colours due to motion, it would afford a means of inferring the approximate distance of these stars.

There may be some facts connected with stellar systems that entirely prevent any supposition of their colours being due to causes such as the above. I should be glad to learn, from some of your scientific correspondents, whether the colour of such stars is known to change, and whether they can be subjected to examination by a prism, polariscope, or otherwise. I should think that the authenticity of such disturbing influences might be tested by a modification of the apparatus used by Foucault in his inquiries into the velocity of light.

A., Loco. Dept., Rugby.

THE USE OF GAS IN DWELLINGS.

To the Editor of the Mechanics' Magazine.

Sir,—Few things have tended to prevent the use of gas in private dwellings so much as the idea, so generally prevalent, that it is unwholesome.

It has often surprised me that gas companies have not taken the question up, as one more immediately affecting themselves. I am convinced, that if they were to offer a reward, as railway companies have done under similar circumstances, for the best practicable mode of ventilating rooms in which gas is burnt, they would find themselves amply repaid in the increased consumption of gas.

In the year 1843, at the June meeting of Civil Engineers, a paper was read giving an account of a mode of carrying off the deleterious products of combustion as applied by Professor Faraday to the gas chandeliers at the Athenæum, London, where the books in the library had sustained considerable injury, and persons frequenting the rooms had suffered much. This, however, was a special case, which would, no doubt, bear a considerable outlay; and the chandelier was, I believe, not a water slide, so that ventilation was rendered comparatively easy up the centre tube. But the majority of common cases are such as would require some simple mode, and which could be applied *without much expense.*

The modern water tubes would probably add a little to the difficulty; but *the principle* must be the same. I shall feel much obliged if some of your intelligent correspondents will, through the medium of your useful publication, suggest some plan adapted to the purpose,—cheap, easily adapted, and not such an eyesore as to forbid its use. I was, not long ago, at a party in a

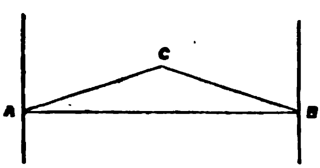
small town in Somersetshire. The next morning, on complaining that I had felt very unwell whilst in the drawing-room, and until we went down to the supper-room, I was immediately told, "It's the gas. Everybody always suffers at their parties." The consequence is, that no one else in the town uses gas in a private sitting-room. The subject is one of very considerable importance, and I am convinced that thousands will rejoice at any suggestion that will remedy the evil. I am, Sir,

CLERICUS.

FLOODGATES OF CANALS.

To the Editor of the Mechanics' Magazine.

SIR,—I am sorry to learn from your valuable journal (February 18th, 1854) that you do not understand the floodgate question, in the form I sent it. You will, perhaps, better understand it in the following form, viz., "Given the breadth (A B) of a river or



canal, to determine the angle (C A B, or C B A) of the floodgates (A C, or C B), so that the said gates may resist the pressure of the water with the greatest ease."

The above problem has been considered by the following distinguished mathematicians:—Mr. John Muller, in a work published in 1736, makes the $\angle$ C A B = 35°. 16′. Mr. B. Martin, in one of his works, arrives at the same result. Bellidore makes the angle C A B = 45°. Dr. C. Hutton makes the angle C A B = 35°. 16′, and in the second volume of the "Institutions of the Physico-Mechanical Mathesis," page 29, the angle C A B = 35°. 16′. Messrs. Wolfenden and Kay differ in their results from the above writers, the former making the angle C A B = 26°. 10′, nearly ("Mathematical Companion," No. 10, pages 104, 105), and the latter confirms Mr. Wolfenden's labours in the same work, No. 28, pages 423, 424. I hope you will at once see my reason for troubling you with the above *important question*, especially when you read over the (preceding imperfect) history of the problem. If you can find room in the next Number of your valuable journal, the insertion will much oblige,

Your obedient servant,

March 8, 1854. A.

EXPLOSION OF GUNPOWDER.

To the Editor of the Mechanics' Magazine.

SIR,—In the U. S. Magazine for October last, page 277, is the following passage:—"There is no instance known of common gunpowder being kindled by a blow of a hammer on an anvil, or an analogous manner." About four years ago, the idea was floating in my mind that gunpowder might be ignited in the above manner, and as I was resolved to test it, I called on Mr. Kennan, machinist, in Fishamble-street, Dublin, and requested him to cause one of his men to try it. He kindly did so: having placed about a pinch of sporting powder, which he took from a flask of his own, on an anvil, the man struck it with a *light* hammer, but the blow was not sufficiently heavy. Another pinch was placed on the anvil, and struck with a heavy hammer, when it exploded. This was repeated. A few weeks ago, I had a similar experiment tried at the Cork and Bandon Terminus, by Mr. Barber, under engineer, with similar results. I mention these *facts* through the pages of your universally-read Magazine, in order to obviate disastrous consequences that might arise from the error promulgated in the U. S. Magazine. Yours, &c.,

J. NORTON.

Victoria Hotel, Cork, March, 1854.

CONSUMING SMOKE.

To the Editor of the Mechanics' Magazine.

SIR,—You have occasionally, in your Magazine, touched on the "Consumption of Smoke," and you observe, that when large furnaces are caused to consume their own smoke, there will still be a vast discharge of sooty matter from the chimneys of dwelling-houses, &c.; and consequently, in densely-populated cities, the smoke nuisance will continue, in a mitigated form, unless a plan be adopted for consuming all the smoke from ordinary fires. Now since smoke is best consumed by being passed through coals at a red heat, cannot a method be carried out of causing all chimneys to conduct their smoke into the present sewers, or large flues running under the pavements, such sewers or flues having at intervals upright shafts containing coke-furnaces, through which the smoke from the flues must be made to pass—the furnaces being advantageously employed in the manufacture of gas for the public streets, &c.?

I am, Sir, yours, &c.,

EDWARD COCKS.

New York Industrial Exhibition.—Special Report of Mr. JOSEPH WHITWORTH. Presented to the House of Commons, February, 1854.

MR. WHITWORTH having been prevented from making a Report upon the Machinery Exhibited at the New York Exhibition, has brought together in this paper the results of his observations made while visiting many of the manufacturing districts of America. This Report is therefore rather a compilation of miscellaneous facts, which the Author has deemed likely to interest and be of service to the people of this country, than a studied representation of the present character and extent of American art and industry. At present we have space for only a few extracts from it; we shall probably add more when we have an opportunity.

Pickling Castings.—The process of "pickling castings," as it is called, is performed in the following manner:

The castings are placed on two wooden stages, covered with lead, each being 20 feet by 12 feet wide, and supported by two rollers, about 18 inches from the floor.

The trough containing the pickle (which consists of 2½ parts of water to 1 of acid) is of the same length as the stages, which are inclined towards it, to enable it to receive the drainings. The diluted acid is poured over the castings by hand from a long ladle, and when they are dry the operation is repeated as often as necessary.

The stages are then inclined in the opposite direction, and cleansed from the coating of acid and sand by a powerful stream of water directed upon them from a hose-pipe.

In England, when the process of pickling is adopted for light castings, it is usual to immerse them in the liquid. The American method was probably adopted in consequence of the high price commanded by manual labour.

Annealing Railway Wheels.—The leading and trailing wheels of locomotives and railway carriage-wheels, are commonly hollow cast-iron disc wheels.

The process of annealing adopted in a large manufactory in Philadelphia is as follows:

The wheels are taken from the moulds, as soon after they are cast as they can bear moving without changing their form, and before they have become strained while cooling. In this state they are put into a circular furnace or chamber, which has been previously heated to a temperature about as high as that of the wheels when taken from the mould; as soon as they are deposited in this furnace or chamber, the opening through which they are passed is covered, and the temperature of the furnace and its contents is gradually raised to a point a little below that at which fusion commences. All the avenues to and from the interior of the furnace are then closed, and the whole mass is left to cool gradually as the heat permeates through the exterior wall, which is composed of fire-brick 4½ inches thick, inclosed in a circular case of sheet iron one-eighth of an inch thick.

By this process the wheel is raised to one temperature throughout before it begins to cool in the furnace; and as the heat can only pass off through the medium of the wall, all parts of each wheel cool and contract simultaneously. The time required to cool a furnace full of wheels in this manner is about four days.

By this process wheels of any form, and of almost any proportions, can be made with a solid nave.

The manufacture of these wheels was commenced in 1847, and in 1850, 15 tons weight were cast per day. The foundry and works, as now completed, are calculated to turn out 40 tons per day.

In another establishment the wheels, while hot, are lifted from the mould, and the centre part is placed in a hole communicating by means of a flue with a high chimney, and the edge is packed round with sand. A draft is thus created which cools the mass of iron near the centre of the wheel, and in some measure prevents it from contracting unequally during the operation.

At a foundry in Worcester, the wheels, when cast, were taken hot from the moulds, and immersed in a pit of white sand, where they are left to cool gradually.

In order to obtain the best chill, it is considered necessary to use cold blast iron made with charcoal.

Railroad-Spikes.—There is a large demand for railroad-spikes in the United States.

On nearly all the railroads the rails are laid on transverse wooden sleepers, and are simply fastened down by large iron spikes with projecting heads, except at the junction of two rails, where the ordinary chair is employed.

In a manufactory at Pittsburgh, a machine was at work which made these spikes, each weighing ½lb., at the rate of 50 per minute. They are packed in kegs, each containing 300. Seven men only are employed on the works, and they manufacture 5 tons of spikes per day.

Nails and Rivets.—In another establishment at Pittsburgh, 250 men are employed in manufacturing bar iron, rods, sheets, and nails. The iron is manufactured both with anthracite coal and charcoal.

They have 51 machines for making cut-nails; many of the mare self-acting in the feeding for the smaller sizes; the strip of iron is inserted in a tube, which is made to revolve alternately half round each way.

They make 2,000 kegs of such nails per week, each weighing 100 lbs., and containing sizes from fourpenny up to tenpenny nails.

A rivet-making machine was at work, which made rivets weighing seven to the pound, at the rate of 80 per minute. Its main shaft carried two cams, one a side-cam, which gave the motion for cutting off and holding the iron between the dies; the other a direct cam, for forming the head of the rivet.

The cams for the nail-machines are made of chilled cast-iron, and that part of the lever which acts against the cam is faced with a plate of bell-metal. Several large grinding-stones were used, having mouldings on their peripheries for restoring the dies when worn.

It is usual in England to soften the dies by annealing previous to restoring their shape, and again hardening them subsequently. The shape may be thus more perfectly restored, but at a greater cost, and the operation of softening and re-hardening deteriorates the quality of the steel.

Cast Steel.—The manufacture of cast steel is not carried on to any great extent. Some works have been started in Pittsburgh, which have hitherto met with great difficulties; but they are now more successful.

Workmen were obtained from Sheffield; but they were intractable, and failed to give satisfaction to their employers.

There were two converting and nine melting furnaces, producing upwards of 2,000 lbs. per day.

The steel sells at 17½ cents. per pound (8¾*d.*)

Engine - Tools. — The engine-tools employed in the different works are generally similar to those which were used in England some years ago, being much lighter and less accurate in their construction than those now in use, and turning out less work in consequence.

The proportion of slide to hand-lathes is greater than in the generality of English workshops.

Planing and drilling-machines are commonly used; but there are comparatively very few horizontal or vertical shaping-machines, and a considerable amount of hand labour is therefore expended on work which could be performed by machines much more economically.

The foundries are, for the most part, large and well arranged, and are furnished with good powerful cranes.

Great anxiety is now manifested by many manufacturers to have engine-tools of a better description than those in use; and before long there will, no doubt, be great improvement in this respect.

Guns and Pistols.—In a large manufactory at Hartford, from 400 to 500 men were employed in making revolving pistols, at the rate of from 1,200 to 1,500 per week.

Self-acting machinery and revolving cutters are used for making all the separate parts, and the tools are made and repaired in a machine-shop, which is attached to the works.

In another establishment, at Worcester, Connecticut, 175 men were at work, manufacturing guns, rifles, and pistols. Revolvers were made in large numbers, with barrels on the old principle, and were all proved by hydraulic pressure.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Hill, Thomas, of Glasgow, Lanark, North Britain, modeller, and Alexander Thompson, of the same place, brick-builder. *Improvements in the manufacture of pipes, or hollow articles, from plastic materials.* Patent dated August 24, 1853. (No. 1970.)

In these inventors' apparatus the clay is fed into a pug-mill in the usual manner, and the moulding-die is attached to the bottom of the clay-chamber. The cone-piece, for shaping the interior of the pipe, is carried loosely on the spindle, and the extremity of the latter passes through the centre of the cone, and carries a disc-plate fast upon and turning with it. This disc-plate carries on its upper side a set of anti-friction supporting pullies, working within a hollow on the under side of the cone, upon the lower surface of which their peripheries bear. The cone is thus guided and suspended from the main spindle without any lateral support.

Pollard, George, of Watling-street, London, envelope manufacturer, and George Mumby, of Hunter-street, Brunswick-square, Middlesex, mechanical draughtsman. *Improvements in machinery or apparatus for the manufacture of envelopes.* Patent dated August 24, 1853. (No. 1971.)

Claims.—1. A general arrangement of machinery or apparatus for effecting the gumming, folding, and stamping of envelopes. 2. The use of spring "pressers" placed inside a plunger, for the purpose of effectually

uniting the gummed surfaces of the envelope. 3. A mode of inclining the flaps of partially-formed envelopes, by means of springs acting inside a folding-box.

HELY, ALFRED AUGUSTUS DE REGINALD, of Cannon-row, Westminster, Middlesex, civil engineer. *Certain improvements applicable to shades or chimneys for lamps, gas, and other burners.* Patent dated August 24, 1853. (No. 1972.)

This invention consists in introducing into or placing upon the articles named in the title, ornamental devices of various colours.

SWONNELL, ALFRED, of Kingston-on-Thames, Surrey, gentleman. *An improved construction of tie for neckcloths and neck-ribbons, applicable also to neck-ribbons of caps and bonnets.* Patent dated August 24, 1853. (No. 1973.)

Claim.—A method of manufacturing ties in such manner that "one extremity of the band or ribbon composing the neckcloth or neck-ribbon, is passed through the fixed barrel of the bow when the tie is in use."

HEARD, EDWARD, of Regent-street, Lambeth, Surrey, chemist. *A certain mixture or composition of chemical agents for rendering sea water fit for washing, and for softening hard water for similar purposes.* Patent dated August 24, 1853. (No. 1974.)

The inventor takes common soda and boils its water of crystallization in an iron pan or other suitable vessel, and reduces the salt to dryness; keeping it constantly stirred during the operation, to prevent incrustation or adhesion of the salt to the evaporating vessel. When it is dry, it is ground in a mill, similar to what is used for paints or colours, to a fine powder, and is then mixed with fresh slaked or hydrate of lime, previously prepared by passing it through a fine wire sieve. It is then fit to be mixed with the water to be softened, &c.

BANKS, CHARLES COLLYFORD, of Clapham, Surrey, brass-founder and finisher. *Improvements in lubricators.* Patent dated August 24, 1853. (No. 1975.)

This invention relates to lubricators attached to chambers in which there exists internal pressure. The oil or grease cocks usually employed for this purpose, consist of a cup to receive the oil, and a tap, with a large hollow plug, having one aperture, which is turned upwards when the plug is filled, and reversed when the oil is intended to escape at the lower side into the cylinder. Mr. Banks' improvements consist in forming the plug of the tap simply with two central passages, one passing out at either end. He fixes the plug vertically on the chamber it is desired to lubricate, and surrounds it by the cup or chamber of the lubricator, into which the oil is introduced previous to its passing into the cylinder.

THOMPSON, ALFRED BECK, of Richmond, Surrey, gentleman. *A new or improved spring door-hinge.* (A communication.) Patent dated August 25, 1853. (No. 1976.)

Claim.—Constructing a spring-door hinge containing two springs, of which one is brought into operation when the door is opened in one direction, and the other when it is opened in the opposite direction.

AUSTIN, WILLIAM, of Holywell-street, Westminster. *Improvements in the manufacture of blocks of plastic materials for building purposes.* Patent dated August 25, 1853. (No. 1977.)

This invention consists of moulding plastic matter into corresponding series of blocks which in building go together and produce the bonding. The blocks are convex, concave, or hollow, as is convenient.

SHAW, JOHN, of Manchester, Lancaster, landscape gardener, and JOSEPH STEINTHALL, of the same place, clerk. *An improved manufacture of artificial manure.* Patent dated August 25, 1853. (No. 1978.)

This invention consists in forming a manure of certain preparations, composed mainly of urine, excrementitious matter, blood, gypsum, lime, and salt.

DAVIS, GEORGE, of London. *Certain apparatus for distinguishing genuine from counterfeit coin.* Patent dated August 25, 1853. (No. 1979.)

This invention consists in constructing a till in which are perforations of sizes suitable for the various coins of the realm, and below each perforation is an apparatus upon which the coin falls, and which remains still if the coin be light, but which allows the latter, if it be of the proper weight, to fall into the box, and then returns to its position again.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent agent. *Improvements in the treatment of wool and silk, and in machinery for preparing silk so treated.* (A communication.) Patent dated August 26, 1853. (No. 1981.)

Claims.—1. The employment of caustic alkaline solutions for scouring animal wool; and the addition of caustic alkali to soap solutions employed for the like purpose. 2. The preparation of animal wool, alone or mixed with vegetable fibres, for dyeing, by immersing it in a caustic alkaline solution, and subsequently in acid or an acid solution. 3. The employment of picric or carbazotic acid and its salts as mordants for animal wool mixed with vegetable fibres. 4. The preparation of animal wool after scouring, by immersing it in a solution of some carbonate or gas yielding salt, and

subsequently in an acid or acid solution. 5. The treatment of cocoon silk, wild silk, &c., by boiling it in a caustic alkaline solution, with the subsequent addition thereto of butter or other soap, alone or mixed with caustic alkali; and the treatment of such silk after boiling, by decomposing therein a carbonate or gas yielding salt by means of acid or salt having an acid reaction, such as alum, or sulphate of alumina. 6. Certain described machinery for opening and preparing silk. 7. The employment, for dressing silk, of a soap formed of wax or stearine, which is decomposed in the fibre by means of an acid.

De Varroc, Eugene, of Great Chesterfield-street, Middlesex, artist. *Certain means of depriving caoutchouc of all unpleasant odour, and of imparting to it various agreeable perfumes.* Patent dated August 26, 1853. (No. 1982.)

This invention consists of three distinct principal processes. The first of these consists in exposing caoutchouc, or articles composed thereof or coated therewith, to the action of baths containing in solution infusions, essences, or extracts of certain aromatic vegetable matters, such as flowers, plants, or roots. The second consists in exposing such articles to the action of currents of air or vapours. And the third consists in immersing the articles in baths containing alkaline solutions of lime. In some cases two of these processes are combined.

Roberts, Richard, of Manchester, engineer. *Improvements in the construction of casks and other vessels.* Patent dated August 27, 1853. (No. 1985.)

This invention consists—*First.* In constructing metallic casks, so that they can be divided transversely into semi-casks of such a form as shall admit of their being stowed one in another when empty; and, *second,* In constructing metallic quarter-casks, which are capable of being similarly stowed.

Hargreaves, William, of Bradford, York, machine wool-comber. *Improvements in machinery for preparing and combing wool, hair, flax, silk, and other fibrous substances.* Patent dated August 27, 1853. (No. 1987.)

In carrying out this invention the wool or other fibrous substance is taken from the feeding rollers and partially drawn by means of a revolving-comb, which is mounted in a crank, and revolves with it, the teeth or "branches" of the said comb being kept upwards and in the required position by means of a tail-pin working through a socket attached to another crank below.

Lancaster, Charles William, of New Bond-street, Middlesex, gun-maker. *A method of and machinery for manufacturing or producing certain descriptions of gun and pistol-barrels.* Patent dated August 27, 1853. (No. 1988.)

This invention applies to barrels which have an elliptical bore or internal section; and the method of manufacturing them consists in operating upon a tube by bending or flattening, and forming it, between grooved rolls, into a barrel, the interior of which shall be spirally elliptical without being cut, rifted, or bored.

Hill, James, of Stalybridge, Lancaster, cotton-spinner. *Certain improvements in machinery used for spinning, doubling, and winding cotton, wool, flax, silk, and other fibrous materials.* Patent dated August 27, 1853. (No. 1989.)

This invention consists in imparting motion, by one endless band, to a series of spindles, instead of to one only, as is ordinarily the case in machines used for the purposes described in the title.

Stirling, John Davie Morries, of the Larches, near Birmingham, Warwick, esquire. *Improvements in the manufacture of rails and parts of railways, and tyres of railway wheels.* Patent dated August 27, 1853. (No. 1991.)

This invention consists of piling bars of crystalline and other iron (combined or not with zinc), so as to give fibrous character to the interior parts of such compound bars, the crystalline iron coming to the wearing surfaces.

Taylor, Samuel, of King-street, Manchester, barrister-at-law. *Improvements in apparatus for generating and applying carbonic acid gas.* Patent dated August 27, 1853. (No. 1993.)

This invention consists in arranging the parts of the apparatus in such manner that the pressure of the gas, as it is evolved, shall cause the mixing of the matters used for evolving the gas to be regulated and to be stopped when the quantity of the gas evolved is sufficient for the required purpose.

Newton, Alfred Vincent, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved construction of steam-hammer.* (A communication.) Patent dated August 27, 1853. (No. 1994.)

This invention relates to the substitution of a single valve and valve-rod, with the necessary induction and eduction ports in place of the system of induction and eduction valves, slides, and rods heretofore in use, where the power of steam has been applied directly to the helve of a forge hammer.

Robinson, George, of Newcastle-upon-Tyne, physician. *A novel application of the slags or refuse matters obtained during the manufacture of metals.* Patent dated August 27, 1853. (No. 1995.)

Claims. — 1. The formation of sheets, plates, or slabs of various thicknesses from the slags or refuse matters obtained during the manufacture of metals, by rolling or otherwise pressing the molten slag on tables artificially heated. 2. The application of the sheets, plates, or slabs thus formed, to roofing and other purposes.

FOSS, JOHN, of Aldgate, London, stationer. *Improvements in printing apparatus.* Patent dated August 29, 1853. (No. 1998.)

"The object of this invention is to combine suitable apparatus into a hand-printing instrument; and it consists of a frame with a handle, in which is placed a roller having thereon the 'form,' or printing surface."

CUNDY, JOSEPH, of Victoria-road, Kensington, Middlesex. *Improvements in kitchen ranges and cooking-apparatus.* Patent dated August 29, 1853. (No. 2000.)

This invention has for its object a mode of applying an oven to a kitchen range or cooking apparatus, "and consists of forming the top, bottom, sides, and back of the oven of fire-bricks or tiles; and these parts are kept together and supported by T and angle iron."

GRIBBON, EDWARD PATRICK, of Dublin, architect. *Improvements in window-frames and sashes.* Patent dated August 29, 1853. (No. 2001.)

A full description of this invention was given in our Number (1593) for February 18, of the present year.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *Improvements in apparatus for heating.* (A communication.) Patent dated August 29, 1853. (No. 2002.)

This invention relates to domestic stoves. The inventor constructs the grate of iron bars (cast or wrought) and fire-brick; the bars are laid horizontally, obliquely, or vertically, on the sides or front of the grate, one above the other, and inclined inwards, so as to permit the free passage of air, and prevent the fuel from falling out. The receiver is charged full with fuel, and is closed by a moveable lid at top.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *Certain improvements in the production of electricity.* (A communication.) Patent dated August 29, 1853. (No. 2003.)

Claim.—"The employment of hydrochloric acid alone, at different degrees of concentration, or hydrochloric and another acid, or saline solution, for the two poles of a battery; and maintaining the strength of the hydrochloric acid, by the addition of the gas of hydrochloric acid or of chlorine, for obtaining a more constant and regular supply of electricity."

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex. *Improvements in the preparation and application of gluten.* (A communication.) Patent dated August 29, 1853. (No. 2004.)

This invention consists in preparing gluten-bread, by baking it in moulds fitted with loose lids, which rest upon the gluten, and rise with it, as the latter expands by the action of the heat.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in the manufacture of water-proof fabrics.* Patent dated August 30, 1853. (No. 2006.)

Claim.—Combining fibres with India-rubber cement, used in cementing fabrics together when manufacturing water-proof fabrics.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in rules, graduated scales, and measuring instruments.* Patent dated August 30, 1853. (No. 2008.)

This invention consists of making rules, graduated scales, and measuring instruments of a compound of India-rubber and sulphur, with or without other matters, the compounded matters being subjected to heat in order to convert them into a hard substance.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in the manufacture and ornamenting or coating of articles when compounds containing India-rubber are used.* Patent dated August 30, 1853. (No. 2009.)

Claim.—The ornamenting or coating articles composed of India-rubber and sulphur (with or without other matters) by electro deposits of metal thereon.

CUNDY, JOSEPH, of Victoria-road, Kensington, Middlesex. *Improvements in gas-stoves.* Patent dated August 30, 1853. (No. 2010.)

This invention consists of constructing the internal chamber of a gas-stove of fire-clay or earthenware.

PICCIOTTO, JAMES, of Crosby-square, London. *Improvements in burning and re-burning animal charcoal.* (A communication.) Patent dated August 30, 1853. (No. 2011.)

This invention consists in making the upright retorts each of several pieces of clay-tiles, moulded to a form suitable to admit of several similar pieces being brought together, and built on one another, to produce the desired form of retort.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved process of dyeing, part of which process is also applicable to bleaching.* (A communication.) Patent dated August 30, 1853. (No. 2012.)

This invention relates, firstly, to dyeing and bleaching cotton and other manufactured goods in a vacuum, and also to subjecting the material to an extraordinary pressure of the atmosphere; and secondly, to certain improvements in the machines heretofore employed in dyeing, and consists in giving to the rollers which carry the cloth a reciprocating instead of a continuous motion in one direction.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for cleaning bran or other offal obtained during the manufacture of flour.* (A communication.) Patent dated August 30, 1853. (No. 2013.)

This invention relates to the employment of an additional scourer, through which the finer grades of offal are passed after their separation from the coarser, in order that they may be subjected to the requisite degree of friction, without involving the necessity of the coarse offal undergoing the same process, and consequently becoming injured by cutting.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for cleaning grain and seeds.* (A communication.) Patent dated August 30, 1853. (No. 2014.)

This invention consists in cleaning and separating grain, by means of a blast spout, screen, and troughs, so arranged that the grain will be perfectly separated from the substances which are usually mixed with it; and so that the grain and the different impurities will be conveyed to separate places and kept distinct from each other.

BURROWS, EZRA WASHINGTON, of Pentonville, Middlesex, civil engineer. *Improvements in the construction of cranes and other machines for raising heavy bodies.* Patent dated August 31, 1853. (No. 2015.)

Claim.—"The arranging of wheels or drums, so that the same shall either balance or assist in the raising or lowering of heavy bodies."

PRICE, ASTLEY PASTON, of Margate, Kent, chemist. *Improvements in treating wash waters containing soap, oils, saponified or saponifiable materials, and in obtaining products therefrom.* Patent dated August 31, 1853. (No. 2016.)

This invention has for its object the employment of sulphurous acid as a substitute, either partly or entirely, for the more expensive acids now used for effecting the separation of fatty and other products from wash waters containing the materials mentioned in the title.

SMITH, EDWARD, of Love-lane, London, gentleman. *An improved mode of manufacturing carpets.* Patent dated August 31, 1853. (No. 2019.)

This invention consists in manufacturing a cheap and durable fabric with a corded or ribbed worsted surface, which surface is produced from the weft, which is thrown in a peculiar manner, two shuttles being employed, one provided with linen weft to form the ground of the fabric, and the other with a woollen weft to form the surface.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for reaping and gathering corn, grain, and other agricultural produce.* (A communication.) Patent dated August 31, 1853. (No. 2020.)

The main feature of this invention relates to a certain mode of constructing and operating the cutters, which consists in constructing the cutters somewhat in the form of scythes, and communicating a motion to them similar to that adopted in mowing by hand, by mounting three, four, or any other convenient number of the scythes, on centres at the bottom of a cylinder, and causing it to rotate around a common centre.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for making barrels and other casks.* (A communication.) Patent dated August 31, 1853. (No. 2021.)

The principal part of this invention consists in forming the staves by passing the stave blanks between grooved or toothed rollers, so arranged with respect to each other, and so curved upon their surfaces, as to give to the stave the required shape, the rollers at the same time being made to compress the wood, so that the shape given to them will be permanently retained.

*** The documents of Nos. 1877 and 2007 are still with the law officers, under objection.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent agent. *Machinery for digging, breaking, and trenching land.* (A communication.) Application dated August 25, 1853. (No. 1980.)

The principal feature of novelty in this machinery consists in the employment of a travelling platform moved by men, horses, oxen, &c., to give motion to the several working parts. When used for digging, the machine is furnished with forks or spades; when for breaking land, with tines or prongs; and when for trenching land, with buckets or scoops similar to those of a dredging machine.

WILSON, ROBERT, of Glasgow, Lanark,

North Britain, calenderer. *Improvements in the treatment or finishing of textile fabrics.* Application dated August 26, 1853. (No. 1983.)

These improvements relate to the production of what is termed the elastic finish. The fabric is hooked at the selvages to pins projecting from endless chains passing round pitch pulleys, and the stretching is effected by giving a differential longitudinal forward motion to the chains; that is, by causing each of them to move alternately at a greater speed than that of the opposite one for the time being.

WATSON, WILLIAM, Jun., of Leeds, manufacturing chemist. *Improvements in apparatus for manufacturing prussiate of potash.* Application dated August 26, 1853. (No. 1984.)

These improvements consist in so constructing and combining apparatus with the iron pots or vessels, in which animal matter is combined with fused potash for the manufacture of prussiate of potash, that such animal matter may be introduced into the pots or vessels through a tube or passage descending into, and communicating with their lower parts, and in connecting with such pots or vessels another and smaller vessel in such manner as to cause it to be heated by the same fire.

BARGNANO, ALEXANDER LOUIS, of New York, United States, gentleman. *Improvements in the manufacture of paper and pasteboard.* Application dated August 27, 1853. (No. 1986.)

This invention consists in employing for the manufacture of paper the stems or storks of hemp and flax, deprived of their bark, and the refuse of the bark which cannot be spun or turned into rope.

HELBRONNER, RODOLPHE, congreve and chemical light manufacturer, of Spring-terrace, Vauxhall-walk, Lambeth, Surrey. *A chemical light, and apparatus for manufacturing the same.* Application dated August 27, 1853. (No. 1990.)

The main features of this invention consist—1. In a hinged-spindle machine and apparatus, with longitudinal and transverse grooves, for the purpose of covering splints or wires with a fibrous substance; and, 2. In the application of cotton, wool, or other fibrous substance to the manufacture of chemical lights.

COLLIER, HENRI GEORGES, gunsmith, of Paris, France. *Improvements in rotary pumps.* Application dated August 27, 1853. (No. 1992.)

Mr. Collier's rotary pump consists of a cylindrical chamber, in the centre of which is an axis, which carries a species of double cam as wide as the chamber, and extending on each side from the axis to within a very short distance of the inner circumference of the chamber, which it thus divides longitudinally into two equal parts.

LACEY, EDWARD, of Handsworth, Stafford, maltster, and WILLIAM WILKINSON, of Nottingham, pattern designer. *A new description of cloth or fabric applicable to most purposes to which woven and knitted fabrics are applied.* Application dated August 27, 1853. (No. 1996.)

This invention consists of a combination of wire with hemp, cotton, linen, or other material capable of being woven or knitted.

HORNBLOWER, JOSIAH, of Poplar, Middlesex, engineer. *Improvements in machinery for steering vessels.* Application dated August 27, 1853. (No. 1997.)

These improvements consist in causing the tiller to travel in a spiral slot or opening cut in a metallic drum or cylinder placed across the deck of the vessel, and supported in suitable standards; a groove is cut at each end of the cylinder, round which a rope or chain may travel.

BEREND, ADOLPHE, of Fenchurch-buildings, London. *Improvements in instantaneous light apparatus.* (A communication.) Application dated August 29, 1853. (No. 1999.)

This invention consists of apparatus combined in such manner, that the material prepared for lighting is caused, when desired, to protrude beyond the case containing it, and the portion protruded is ignited by friction, caused by the drawing back of a comb or apparatus, which is simultaneously protruded with the prepared ignitable matter.

BALD, JOHN, of Carse-bridge Distillery, Alloa, Clackmannan, North Britain, distiller, and CHARLES MAITLAND, of the same place, brewer. *Improvements in distilling.* Application dated August 30, 1853. (No. 2005.)

This invention consists in so arranging the apparatus of distillation, that the "analyser" may be connected with the "low wine still," or spirit still, or in any way connecting an analysing or distilling column, or continuous analyser, with the common still or stills, for the purpose of making spirits direct from the wash.

DAWSON, THOMAS, of King's Arms-yard, London, machinist, and THOMAS RESTELL, of the Strand, Westminster, chronometer maker. *Improvements in fishing-rods.* Application dated August 31, 1853. (No. 2017.)

This invention consists in constructing the parts of the joints of fishing-rods in the shape of a segment of a circle, and in permanently connecting them; each joint lying in that next preceding it, when the rod is inserted in the butt portion, which is made cylindrical, and to resemble a walking stick.

PROVISIONAL PROTECTIONS.

Dated October 21, 1853.

2434. Charles Nicolas Michel and Augustin Lecomte, of Paris, France. Certain improvements in windows.

Dated January 21, 1854.

145. Marie Louise Lise Beaudeloux, of Paris, France, spinster. A self-acting cradle, with improved mattrass.

Dated February 20, 1854.

395. John Reed Hill, engineer, of Princes-street, Stamford-street, Lambeth. Improvements in machinery for pulverizing metallic ores, or other similarly hard substances.

397. William Henry Barlow, of Derby, civil engineer. Improvements in securing and connecting the rails of railways.

401. John Chisholm, of Holloway, Middlesex, chemist. Improvements in the purification of gas.

403. Harvey Hilliard, of Glasgow, Lanark, North Britain, of the firm of Hilliard and Chapman, cutlers. Improvements in apparatus for cleaning and sharpening table cutlery.

405. William Milner, of Liverpool, Lancaster, fireproof-safe manufacturer. Certain improvements in locks for safes, which said improvements are applicable to locks in general.

407. John Urie, of Glasgow, Lanark, photographic artist. Improvements in photographic pictures.

Dated February 21, 1854.

409. Frederick Osbourn, of Aldersgate-street, London, tailor. Certain improvements applicable to the cutting out of garments.

411. John Gedge, of Wellington-street South, Middlesex. Improvements in the construction or adaptation of certain fittings for gas. A communication.

413. Stopford Thomas Jones, of Union-court, Old Broad-street, London. Improvements to reduce and wash minerals to extract metal therefrom, especially gold.

415. James Boydell, of Gloucester-crescent, Regent's-park. An improvement in the manufacture of hurdles and gates.

417. James Smith, of Glasgow, Lanark, pattern-weaver. Improvements in ornamental weaving.

419. Adam Dixon, of Smethwick, Stafford, engineer. Improvements in railway axle-boxes and bearing-springs.

421. Anthony Bernhard Baron Von Rathen, of Wells-street, Middlesex. Improvements in omnibuses, for the purpose of adapting them to be drawn by one horse, and to be attended by one man only.

423. William Charles Theodor Schaeffer, of Stanhope-terrace, Hyde-park-gardens, Middlesex, analytical chemist. An improved mode of recovering the fatty matters contained in waste waters of woollen mills.

Dated February 22, 1854.

424. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improvements in fire-arms and in projectiles. A communication.

425. James Morison, of Paisley, Renfrew, machinist. Improvements in celestial and terrestrial globes.

426. Edward Taylor, of Kinghorn, Fife, heckle-maker. Improvements in gill-heckles or combs for treating fibrous materials.

427. Damiano Assanti, of Upper Berkeley-street, Middlesex, gentleman. A means of rendering porous substances waterproof.

429. Samuel Colt, of Spring-gardens, Middlesex, gentleman. Improved machinery for rifling fire-arms. Partly a communication.

430. James de Wolfe Spurr, of Kenyon-terrace, Birkenhead. Improvements in distilling coals and bituminous and resinous substances and products thereof.

431. James Boydell, of Gloucester-crescent, Regent's-park. Improvements in applying apparatus to carriages to facilitate the draft.

Dated February 23, 1854.

432. Thomas Settle, of Bolton-le-Moors, Lancaster, spindle-maker, and Peter Cooper, of the same place, flyer-maker. Certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous materials.

433. Adolphus Oppenheimer, of Manchester, Lancaster, manufacturer. Certain improvements in the manufacture of mohair velvet or mohair plush.

434. Thomas Robinson, of St. Helen's, Lancaster, ironfounder. Improvements in machinery or apparatus for raising and lowering goods.

435. Joseph Barling, of High-street, Maidstone, Kent. Improvements in treating the hop-bine, and rendering it applicable to the manufacture of paper and other articles.

437. Thomas Danson Pruday, of Rupert-street, Haymarket, Middlesex, cook. Improved apparatus for cooling liquids and edible substances.

438. William Hunt, of Lea Brook Chemical Works, near Wednesbury, manufacturing chemist. Improvements applicable to the utilizing of ammonia given off in certain manufacturing processes.

439. Hugh Stoy, of St. John's-road, Battersea-rise, Surrey, yeoman. Stopping of engines and carriages on railways, and also vehicles of every description on the common roads.

440. Edward Foard, of Nicholas-street, New North-road, Middlesex. Improvements in furnaces.

Dated February 25, 1854.

441. Peter Fairbairn, of Leeds, York, mechanist. Certain improvements in machinery for winding slivers of flax, tow, or other vegetable fibrous materials into laps or balls.

442. William Ryder, of Bolton-le-Moors, Lancaster, machinist, and James Ryder, of the same place, agent. An improved composition applicable to coating metals.

443. Edward Kingsbury, of Knightsbridge, Middlesex, gentleman. Improvements in apparatus for indicating the rise or fall of water or other liquids in ships' holds, tidal harbours, or other vessels or places.

444. Samuel Little Hardy, of Dublin, M.D. An improved apparatus for applying chloroform vapour or other similar vapour in certain cases.

446. Charles Cowper, of Southampton-buildings, Middlesex. Improvements in furnaces. A communication from Léonard Laureau, of Paris, France.

447. Charles Cowper, of Southampton-buildings, Middlesex. Improvements in the manufacture of potash and soda. A communication from Léonard Laureau, of Paris, France.

448. John Banfield, of Birmingham, Warwick, organ-builder. Improvements in apparatus for communicating (while riding) with the drivers or guards of public or private vehicles.

451. Cyril Jeddere Fisher, of the Temple, London, Esq. Improved means of detecting forged or counterfeit bank-notes, bills of exchange, cheques, or other documents, labels, or trade marks.

452. Edward Hammond Bentall, of Heybridge, Essex, ironfounder. Improvements in ploughs or implements for cultivating land.

453. Edward Power, of Birmingham, Warwick, gentleman, and Thomas Knowles, of the same place, watchmaker. Improvements in watches, spring clocks, and time-pieces.

454. Thomas Forsyth, of Wolverton, Buckingham, engineer. Improvements in furnaces.

455 Auguste Edward Loradoux Bellford, of Castle-street, London. Certain improvements in

machinery for dressing stone. A communication.

457. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in engines for generating power by means of the expansive force derived from heated air and gases, or by means of the expansive force of liquid carbonic acid and other expansible liquids. A communication.

458. John Barker and John Andrew, both of Salford, Lancaster, salesmen, and William Hayes, of Salford aforesaid, bleacher. Improvements in cleansing sheep's wool, mohair, and other animal fibrous substances.

459. Charles William Siemens, of Adelphi Chambers, Middlesex, engineer. Improvements in electric telegraphs. Partly a communication.

461. George Collier, of Halifax, York, engineer. Improvements in twisting fringes of shawl and other fabrics.

462. James Keenan, of Paris, manufacturer. Improvements in forming blocks or surfaces for printing. A communication.

463. Constant François Bekaert, of Rue de la Victoire, Paris. Improvements in linseed-oil for painting, called "Oxigenated Oil." A communication.

464. Charles Lamport, of Workington, shipbuilder. Improvements in machinery used in ship-building.

465. James Boydell, of Gloucester-crescent, Regent's-park, Middlesex. Improvements in the manufacture of hurdles and fences.

466. John Elder, of Glasgow, Lanark, engineer. Improvements in marine steam engines.

467. Alexandre Plantin, of Thayer-street, Manchester-square, Middlesex. Improvements in the arrangement and combination of apparatus for stopping and retarding railway trains and carriages.

468. William Edwards Staite, of Manchester, Lancaster, gentleman. Improvements in the treatment and preparation of madder and munjeet for dyeing and printing.

469. Frederick Westbrook, of Kensington, Middlesex. Improvements in apparatus for facilitating the cleaning of windows.

Dated February 27, 1854.

471. Pierre (Peter) Fougerat, of Bordeaux, France, civil engineer. Improvements in paddle-wheels of steam-vessels.

472. John Davie Morries Stirling, of the Larches, near Birmingham, Warwick, Esq. Improvements in the manufacture of tubes and cylinders of steel.

473. Charles de Bussy, of Mornington-road, Regent's-park, Middlesex, mining engineer. Improvements in machinery or apparatus for the amalgamation of gold ores.

474. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in harrows. A communication.

476. John Morrell, of Bradford, York, grocer. Stopping the tap of any vessel containing oil, treacle, or any other liquid, as soon as the quantity required of such oil, treacle, or other liquid has been taken therefrom, such quantity being ascertained by weight.

Dated February 28, 1854.

480. Ellis Marsden and John Marsden, of Liverpool, Lancaster, engineers and brassfounders. Improvements in pumps.

482. John Henry Rehè, of Bayswater, near London. Improvements in machinery or apparatus for mixing, washing, crushing, bruising, reducing, or comminuting various substances.

484. Colin Mather, of Salford Iron-works, Manchester. An improvement in valves for reducing the pressure of steam.

486. William Patten, of Old Fish-street, London. Improvements in valves and apparatus for supplying water.

488. Edward Clarence Shepard, of Trafalgar-square, Middlesex. Improvements in decomposing water by electric currents. A communication.

490. Thomas James Johnson, of Booth-street, Spitalfields. Improvements in apparatus for roasting malt.

492. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. An improved apparatus for facilitating the acquirement of the art of reading. A communication from Nicolas Chéron and Florimond Nicolas Tallempin, of Paris, France, manufacturers.

Dated March 1, 1854.

494. Jean Toussaint Cortin, of New Compton-street, Soho-square, Middlesex. Soleing shoes and boots with leather combined with gutta percha and wood, sewed with metallic wire.

496. Charles Hargrove, of Birmingham, Warwick, manufacturer. An improvement or improvements in steam boiler and other furnaces.

498. Thomas Henry Ewbank, of South-square, Gray's-inn, Middlesex, gentleman. Improvements in the manufacture of terry or looped fabrics, and in machinery for producing the same.

502. William and Joseph Clibran, of Manchester, Lancaster, machinists and copartners. Certain improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.

506. Thomas Metcalfe, of High-street, Camden-town, Middlesex. Improvements in the manufacture of portable and folding bedsteads, chairs, seats, tables, and cots.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

504. Thomas Truscott and Thomas Palmer Baker, engineers Royal Navy, and members of the Naval Engineers' Club, at Portsea, Hants. An improved arrangement of steam engines adapted to screw propulsion. March 1.

515. William Brown, of Glasgow, merchant. An improved mode of obtaining volatile products from bituminous coals and other bituminous substances. March 3.

519. John Nicholson, of Dublin, engineer. Improvements in and applicable to certain descriptions of close kitchen ranges. March 3.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March* 10*th*, 1854.)

2357. Sir John Scott Lillie. Improvements in machinery for breaking stones and other hard substances.

(*From the "London Gazette," March* 14*th*, 1854.)

2330. Charles Rowley. Improvements in ornamental dress-fastenings.

2390. John Macmillan Dunlop. Improvements in machinery or apparatus for pressing goods, applicable also to raising or removing heavy bodies.

2399. George Louis Stocks. Improvements in ships' jacks-stays for masts, and gaffs for fore and aft sails.

2451. Charles Brewster. Improvements in printing-machinery. A communication.

2452. Edward John Montagu Archdeacon. An improved method of indicating places, divisions, or contents, in directories.

2495. Malcolm Maclaren. Improvements in fire places, grates, or furnaces.
2541. Frederick Lipscombe. Improvements in obtaining steam power, and in regulating the same.
2543. Henry Brierly. Improvements in machinery or apparatus for spinning and doubling cotton and other fibrous substances.
2547. Peter McGregor. Improvements in machinery for spinning and doubling.
2581. Marino Louis Joseph Christophe Vincent Falconi. A certain composition for the preservation of the dead.
2741. Alexandre André Victor Sarrazin de Montferrier. Improvements in wheels for vehicles on common roads and railways.
2946. Robert Whewell. Improvements in machines used for cutting paper.
2964. Archibald Thompson. Improvements in setting out and marking the rivet-holes in the plates used in constructing iron ships, boats, boilers, and other vessels.
28. Alfred Vincent Newton. Improved machinery for crushing or grinding and washing and amalgamating quartz, rock, and other substances. A communication.
109. Henry Holland. Certain improvements in the construction of parts of umbrellas and parasols.
228. John Henry Johnson. Improvements in the manufacture or production of gas, and in the application of the materials employed therein. A communication from Andre Koechlin, Napoléon Joseph Vicomte Duchatet, and Joseph Antoine Auguste de Perpigna.
249. John Buchanan. Improvements in propellers, and in applying them.
281. Robert Stirling Newall. Improvements in setting up ships' rigging.
353. Thomas Bury, Walter Glover, James William Speed, and John Hardman. Improvements in machinery or apparatus for stretching, drying, and finishing yarn and woven fabrics composed of cotton, wool, silk, or other fibrous materials.
359. Arthur Jonson. Improvements in preparing barley and grits or groats.
375. John Davie Morries Stirling. Improvements in the manufacture of steel.
378. Thomas Fawcett the younger. Improvements in weaving linen or other fabrics to produce plaits or folds therein.
385. Joseph Hinchliffe, junior. Certain improvements in metallic pistons for tightening or adjusting the packing of the same, and also improvements in the construction of such pistons. A communication.
398. John Aspinall. An improvement in machinery employed in the manufacture of sugar.
401. John Chisholm. Improvements in the purification of gas.
403. Harvey Hilliard. Improvements in apparatus for cleaning and sharpening table cutlery.
405. William Milner. Certain improvements in locks for safes, which said improvements are applicable to locks in general.
407. John Urie. Improvements in photographic pictures.
409. Frederick Osbourn. Certain improvements applicable to the cutting out of garments.
412. Victor Pernollet. Improvements in machinery or apparatus for sorting or separating wheat and other grain from different kinds of grain, and for separating or removing extraneous matters from wheat and other grain.
414. Robert Walker. Improvements in signaling by voltaic electricity, for the purpose of increasing the safety of railways.
415. James Boydell. An improvement in the manufacture of hurdles and gates.
422. William Gossage. Improvements in the manufacture of certain alkaline carbonates, and in the useful application of such carbonates.
423. William Charles Theodor Schaeffer. An improved mode of recovering the fatty matters contained in waste waters of woollen-mills.
424. William Edward Newton. Improvements in fire-arms and in projectiles. A communication.
430. James de Wolfe Spurr. Improvements in distilling coal and bituminous and resinous substances and products thereof.
441. Peter Fairbairn. Certain improvements in machinery for winding slivers of flax, tow, or other vegetable fibrous materials into laps or balls.
444. Samuel Little Hardy. An improved apparatus for applying chloroform vapour or other similar vapour in certain cases.
452. Edward Hammond Bentall. Improvements in ploughs or implements for cultivating land.
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472. John Davie Morries Stirling. Improvements in the manufacture of tubes and cylinders of steel.
498. Thomas Henry Ewbank. Improvements in the manufacture of terry or looped fabrics, and in machinery for producing the same.

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Sealed March 10, 1854.

2089. Arthur Warner.

Sealed March 11, 1854.

2107. John Lilley, junior.
2118. Alexander Allan.
2127. Philip Webley.
2144. Thomas William Keates.
2164. Jonathan Burton.
2169. Richard Archibald Brooman.
2204. Alexander Dalgety.
2220. Louis Dominique Girard.
2221. John Barsham.
2240. John Taylor.
2252. William Brown.
2283. Joseph Henry Cary.
2933. Charles Goodyear.
2948. John Tribelhorn and Dr. Pompejus Bolley.
2985. Francis Bennoch.
3014. Henry Jackson.
3033. John Pym.
3035. Alfred Trueman and Isham Baggs.

1854.

68. Joseph John William Watson.
162. John Lockhart, junior.
168. Auguste Edouard Loradoux Bellford.

Sealed March 13, 1854.

2119. James Hill Dickson.

Sealed March 14, 1854.

2128. John Timmis.
2129. Alexander Wallace and George Galloway.

Sealed March 15, 1854.

2141. Eliezer Edwards.
2143. Henry Kraut.

2147. Henry Jeanneret.
2152. David Mushet.
2159. Alexander Thomson and David Lockerbie.
2160. John Adcock.
2161. Baldwin Fulford Weatherdon and Matthew Slade Hooper.
2166. Christopher Nickels and Ralph Selby.
2172. William Lanphier Anderson.
2270. James Lee Norton.
2783. Peter Armand Lecomte de Fontainemoreau.

1854.

97. William Crosskill.
107. William Crosskill.
115. Edward Lord.
181. John Bapty.

NOTICES TO CORRESPONDENTS.

A Constant Reader.—The previous registration by no means invalidates the patent obtained for the article in its improved form, although, in its original form, it becomes the property of the public at the expiration of the registration.

S. S.—All the parts claimed as new may bear the word "Registered," whether combined or not.

W. A. Hunt—We are not aware of the existence of any such patent as that you mention.

H. Walters.—We will endeavour to find space shortly for a description of your invention.

Hereford.—A description of the instrument you refer to appeared in No. 1429 of the *Mechanics' Magazine*, Dec. 28, 1850.

G. W. James, M.D.—Your article would be acceptable.

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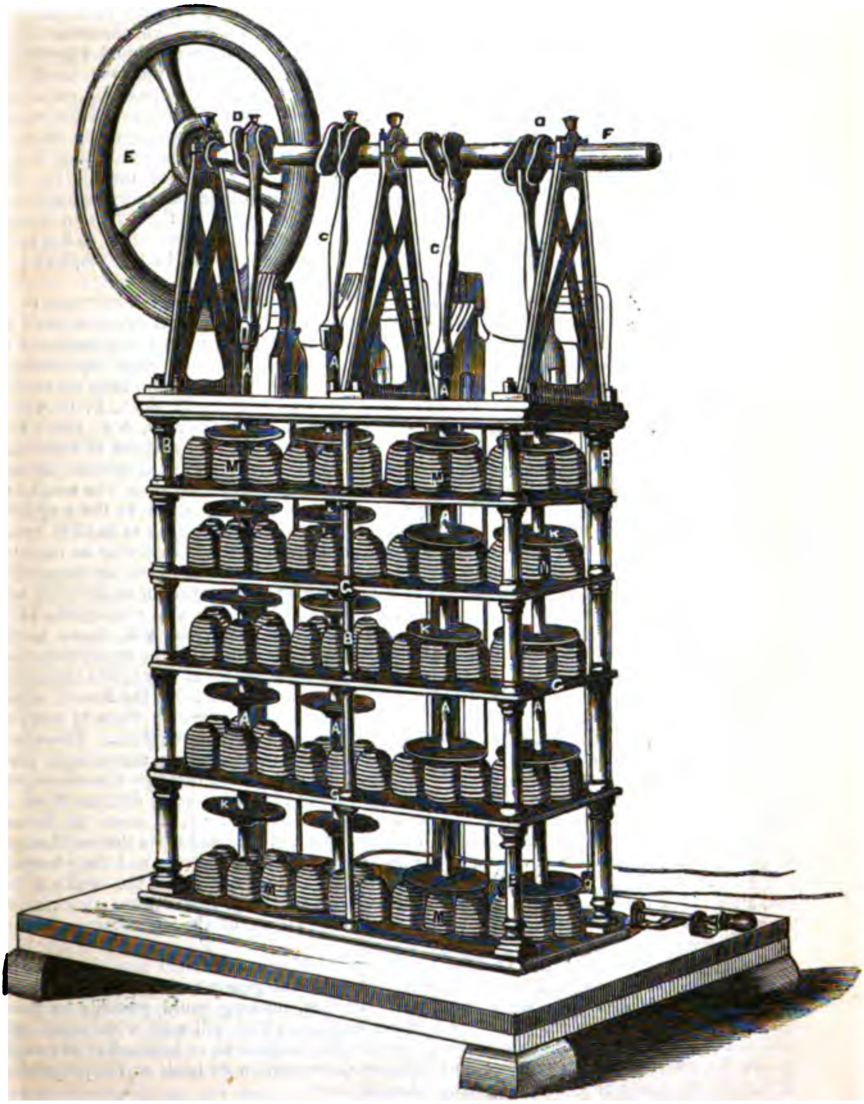
ALLAN'S ELECTRO-MAGNETIC MOTIVE-POWER ENGINES.



ALLAN'S ELECTRO-MAGNETIC MOTIVE POWER ENGINES.

(Patent dated June 24, 1852.)

In a previous number (1535) we announced our intention of publishing a description of the invention that we are now about to bring before our readers. At that time we expressed our high estimate of the principle of Mr. Allan's machine, and subsequent developments of the invention, effected by the author, have fully established our opinion.

The object of the inventors of motive power engines to be worked by electro-magnetism is, as our readers are aware, to construct apparatus in which the enormous forces which electro-magnets are capable of exerting through small spaces shall produce either such a reciprocating motion in a rod, or such a rotary motion in a shaft, as shall be adapted to the operation of all kinds of machinery. For the designing of such an apparatus it is evident that neither exact electrical knowledge alone, nor exact mechanical knowledge alone, is sufficient. This has also been sufficiently proved by the numerous machines that have already been brought forward. In the well-known rotary engine, for example, the electric current was cut off long before the magnetic force had reached its maximum; and, again, in the oscillating engine the magnets that were successively brought into action were necessarily placed at such different distances from the centre that it was mechanically impossible to produce an equable motion by means of them. In Mr. Allan's machine, however, both mechanical and electrical conditions are very simply and beautifully complied with; and it is to this fact that the success of the invention is due. Each magnet acts under exactly the same mechanical conditions as every other, and in each the magnetic force is exerted until the maximum force, which the battery employed is capable of generating, has been fully brought into action.

The main feature of this invention consists in the application of electric currents, so as to form several electro-magnets in succession, by means of which several impulses shall be successively given in the same direction to a rod capable of being moved longitudinally to any extent which may be required. The engraving on the preceding page represents a perspective view of a machine in which this application is made. A A are rods connected by means of the connecting-rods, C C, and the cranks, D D, to the shaft, F, to which motion is to be communicated. B B is a frame through which the rods, A A, pass; and G G are galleries on which are mounted the electro-magnets, M M, by means of which the impulses are to be given to the rod, A A. Upon this rod, A A, are fixed shoulders, against which the keepers or discs of iron, K K, are intended to be pressed by their own weight or otherwise, so as to be successively in proper positions to be acted upon by the magnets, M M; and each of the keepers, K K, is made with a hole in its centre, so as to slide easily upon the rod, A A, and not impede the motion of the latter when it is receiving an impulse from a magnet applied to any of the other keepers or discs. E is a fly-wheel for regulating as usual the motion of the machine. The sliding surfaces employed for completing and breaking the circuits are shown behind the cranks. It will be seen that exactly the same kind of action is intended to be produced on each of the four rods, A A, shown in the engraving, although at the time that one pair of the rods has completed the stroke the other pair will be commencing another. It will be sufficient, therefore, for us to explain the action that takes place on one of the rods. At the commencement of a stroke, the first or upper keeper is placed sufficiently near to the first set of magnets to enable them to exert an available force upon it, and to move it through the space that separates them. Therefore, when a current of electricity is applied to this first set of magnets, they accordingly draw down the keeper to them, and move the rod, A A, longitudinally through the space just mentioned. The next keeper is, by this means, brought within the same distance from its magnets, and the current of electricity is at the same moment cut off from the former and applied to these, which thereupon draw their keeper to them, and move the rod through an additional space or distance equal to the first; and the other magnets and their keepers will respectively act in a similar manner in succession, and thus complete the stroke of the rod, after which the opposite rod will be operated upon similarly, the reciprocating motion thus obtained being converted into rotary motion by means of the connecting-rod and crank in the ordinary manner.

The engraving represents a vertical stationary machine constructed according to Mr. Allan's invention; but it will be easily seen that the arrangement of the parts may be very readily adapted to all possible purposes. In fact, nothing could possibly be more susceptible of convenient adaptation than these engines, which will work with equal efficiency whether the series of magnets are either vertical, horizontal, or inclined at any angle to suit the different circumstances of manufactures, locomotion on land, or the propulsion of vessels, by means of either the paddle-wheel or screw.

The foregoing description will be found to afford a sufficient account of the nature and operation of Mr. Allan's engine. Every one acquainted with mechanics and electricity will at once see that it is constructed according to the principles of those sciences, and that it is calculated to effect results of a most important character. Of course there is ample room for improving the machine by modifications of its details, the necessity for which elaborate experiments alone will point out. But the fact that electro-magnetism may be effectively and profitably applied as a motive power, is sufficiently established by this invention. The fact is, Mr. Allan has done as much as ought to be left to a private individual to effect. The splendid results promised by the invention are sufficient to make the further prosecution of it a matter of public duty. We think the Government should not withhold its patronage from a scientific improvement which far exceeds in importance those which other nations have long since fostered from the public purse.

We may fitly conclude this article by directing attention to a lecture lately delivered by the Rev. A. Bath Power, Principal of the Diocesan Training Institution, Norwich, on "Electro-motive Power." After offering several interesting preliminary remarks, the lecturer said it would be imperative, in order to restrict the lecture to reasonable limits, to pass over the effects produced on the magnetic needle by voltaic currents, the mutual influence of currents on each other, the electro-magnetic rotations, and other phenomena, and proceed at once to the illustration of the nature of electro-magnetic induction. Before proceeding to the experimental demonstration of the facts connected with induction, he explained the broad principles upon which the construction of the voltaic battery depends; he spoke of it as a wonder-working instrument, and expressed his conviction that it would leave a broader mark upon the history of human progress than any other creation of man's genius; he described the mode of carrying the current or stream of electric influence from the battery to the various apparatus to be employed; and afterwards showed the effect of an electric current in rendering soft iron powerfully magnetic, while in circulation about it. A series of experiments followed, to exhibit the great holding power of the electro-magnet; and to show that the force very rapidly diminishes as the distance through which it is to be exerted increases.

This circumstance had always constituted one of the chief difficulties in the application of the principle to practical purposes. He would presently explain how it was obviated in the beautiful contrivance introduced by Mr. Thomas Allan with his machine, a model of which was upon the table. Mr. Power illustrated, at this point of his lecture, the distinction between quantity and intensity magnets, showing that the former ought always to be used for motive machines, to assist as much as possible the loss occasioned by the setting up of the secondary currents. Mr. Power then proceeded to show the relative advantage of the powers of Electro-Magnetism and Steam. As far as its economy was concerned the advantage was as yet on the side of steam, and with the appliances at present at our command, it would be found more costly to employ the electro-magnetic agent; but in many instances, besides those in which small powers only were required, other considerations besides cost entered into the account, and it would be found most useful and convenient to be able to obtain a moving force without the necessity of using fire. The invention which was brought under notice as the leading feature of the lecture, has been patented in Great Britain, and throughout Europe, by Mr. T. Allan, of Adelphi Terrace, London, and consists of a very ingenious combination of electrical and mechanical principles, avoiding the mistakes which have proved fatal to other schemes. Mr. Power stated, that in most of the arrangements with which he was acquainted there was either an electrical or mechanical error. On the plan shown by the beautiful model on the table, Mr. Allan had succeeded in using the force of a series of electro-magnets in such a way as to employ the attractive energy only over a distance that was practically efficient, and this series of pulls was made to actuate a crank so as to obtain rotatory motion of any given power required. By adjusting the size and number of cranks and magnets, any force might be obtained, from one only sufficient to turn a watchmaker's drill, up to a power equal to turn the auxiliary screw of a first-class merchant ship. Mr. Power then explained the peculiar construction of Mr. Allan's magnets, illustrating their great relative power; and spoke of the invention as one of much promise, and deserving public attention.

The Lecturer recalled the attention of the audience to the problem to be solved in the arrangement of electro-magnetic engines, namely, to connect the *great power* of an electro-magnet acting through a *short distance* into an *available stroke;* he explained the mode adopted by Mr. Allan, referring to the working model, and expressed his conviction that this principle would be turned to good account, and that it was well worth the attention of capitalists. He stated that engines might be constructed of any power, to work in either a vertical or horizontal plane; and that the first cost would be much less than

that of a steam-engine of corresponding dimensions and force. He reminded the audience that engines of small power working on the plan under consideration would be of great use to watch-makers, grinders, polishers, lapidaries, &c., as both their hands, by this means, might be set free for the manipulations of their respective trades. He spoke of the applicability of electro-magnetic engines to locomotion on roads and railways, especially for branch and subterranean lines; and dwelt at some length on their adaptation to auxiliary screws in merchant vessels, and entered into a variety of important and interesting details, into which our limits will not permit us to follow him. In conclusion, the rev. lecturer said that he could not but again direct attention to the fact how directly and immediately the application of this power could be traced to the physical principles which had been illustrated during the evening. It was one of the many instances presented in modern times of the physical philosopher finding an immediate practical result from the labours of his investigations. Mr. Power then proceeded to pay a just tribute to the value and importance of physical science as an element of general education, and expressed his conviction that the time would come when all educational establishments would find it necessary to meet the popular demand by making proper arrangements for including it in their ordinary routine. But he cautioned the audience against being unduly elevated by the great achievements effected by the genius of man, and recommended that the triumphs of science should be ever regarded as manifestations of the workings of God's higher providences, timing the development of new powers to the wants of his creature, man, and showing that as He had willed man's progress, so the instrumentality was brought out as circumstances required.

SIGNALIZING ON RAILWAYS.

Description of an Improved Apparatus for communicating Signals from one part of a Railway Train to another. By the Rev. W. F. Greenfield, M.A., Ipswich, Suffolk.

I. The objects proposed to be effected by this apparatus are the following:

1. To enable the guard or guards on or in a train to communicate instantaneously with the driver and with one another.

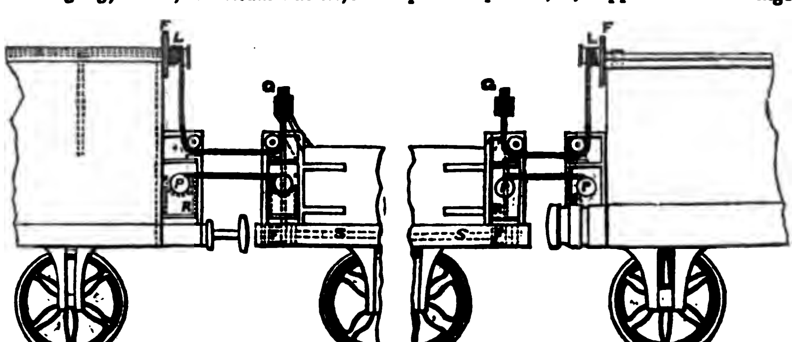
2. To enable passengers in any compartment of any carriage to signal either to the guard or to the driver.

3. To provide a self-acting means of signalling to the guards and driver such an accident as the uncoupling of carriages, or their running off the line.

II. The means adopted far these purposes are as follow:

On the tender, close to the engine, is placed a gong, or bell, or a steam-whistle, fed by a pipe from the engine, the gong or bell being provided with a spring tongue, or the whistle with a spring lever or a slide-valve. A similar gong or bell is placed near each guard. Along the side (or top of the tender, as is most convenient), runs a spindle, revolving freely in proper bearings, having fixed to the end near the engine a toothed wheel, to act in its revolution upon the gong or whistle, and having at the other end a fixed drum, about six or eight inches long, and of any convenient diameter.

Along the top of each carriage, immediately under the roof and midway between the sides, or at the bottom of each *truck*, are placed spindles, S, supported on bearings



let into the ends and divisions of the carriages, and revolving freely on them. Each end of the spindles projects about 10 or 12 inches from the carriage. On the projecting

parts of the spindles are placed a fixed wheel, F, about 2 inches broad, and a line drum, L, about 6 or 8 inches long, and of any diameter that may be convenient, the wheel and drum clutching, when turned in one direction, and being free to move alone in the contrary direction. In the case of trucks the fixed wheel is dispensed with, and a fixed drum substituted for the line drum, as on the tender. Wherever a guard is stationed the line drum is provided with a hand wheel, as well as the fixed wheel. Half-coiled on the drums are ropes, in such a manner that the tension on the loose end shall cause them to clutch with the wheels. The ropes pass downwards (or in the case of trucks *upwards* to guide pulleys, and from these *downwards*) to pullies, after being carried under which, every adjacent tier are joined between the carriages. These pullies are fixed, with their planes vertical, in heavy plates resting on the top of rectangular frames, which are capable of a vertical motion to the extent of about 9 or 10 inches.

The frames are so arranged, that when in their lowest position (as they should be when the carriages are as close as the buffers will allow them to be), the plates are all about the same height above the level of the railway. They are placed also with their planes either perpendicular or parallel to the ends of the carriages. In the former case, the frame is provided with two racks, R, placed opposite one another; in the latter case, each side of the frame has two pins placed at a proper distance. The vertical motion is communicated to the frame in the one case by a partially toothed wheel, P, of the same pitch as the rack; in the other case, by two cambs having the form of the spiral of Archimedes. These wheels or cambs turn on spindles, working in horizontal bearings, on which are fixed also cylindrical drums, whose circumferences are equal to the up-and-down stroke of the frame, and whose diameter is therefore equal to that of the toothed wheel. Round each of these drums is coiled a rope, the end of which is joined to that on the adjoining carriage.

III. The above being the arrangement, the action will be readily understood.

It is clear that, as the carriages separate, there will be tension on the lower drums, which will turn the wheels or cambs round, and cause the frames to ascend. In this ascent there will be just as much rope set free between the upper drums and the pullies as is uncoiled from the lower drum. Thus the distance between the pullies will be increased in the same degree as between the carriages, without any action taking place on the upper drums. This will be so, provided that the carriages do not increase their distance by more than a circumference of the lower drum. Should this distance be exceeded, then the frames will be pulled down, and so the ropes on the upper drums being pulled, a signal will be spontaneously passed along the train. On the other hand, as the carriages collapse, the tension on the lower drums being relaxed, the frames descend by their own weight, and, turning the drums, recoil the rope. Thus the apparatus is kept *always in gear*, so that a signal may be passed *instantaneously*.

The guard on making a signal has only to turn the line drum near him in one direction, and the fixed wheel in the contrary. By this means he will send a signal in both directions along the train at the same time.

If there be fixed on the spindles running through the carriages small pulleys, with projections on their surface, on which shall hang endless chains, a passenger on pulling the chain in either direction will pass a signal either to the driver or guard according as he may turn the spindle, so as to clutch the line drum in the front or rear of the carriage.

IV. The dimensions of the whole apparatus are very insignificant, and such as not in any way to be inconvenient. For allowing an increase of 18 inches between two carriages, as the most that is due to tension on the coupling irons, this will give 18 inches as the circumference of the lower drums, and an ascent of 9 inches for the frame, which therefore need not be more than 15 or 16 inches high.

The cost of the whole would be exceedingly small.

NOTÆ MATHEMATICÆ.

By T. T. Wilkinson, F.R.A.S., and Corresponding Member of the Manchester Literary and Philosophical Society.

NO. I.

The Rev. John Lawson, B.D., and the Rev. William Crakelt, M.A., are well known as two distinguished geometers of the last century. The former made good his claim to be considered both as a mathematician and a divine by the publication of a volume of sermons "On the Duty and Office of a Bishop," and by the translation and enlargement of several of the best modern restorations of the ancient treatises on geometry; the latter gentleman is best known by his translation of Manduit's "Trigonometry," and by his improved edition of Entick's "Tyronis Thesaurus."

Both of these gentlemen were graduates of the University of Cambridge, and as such

certainly do honour to their *alma mater*. In pure geometry, they were undoubtedly superior to most of their contemporaries; they had evidently profited much by the example of Professor Thomas Simpson and his writings, and while many of their isolated *opuscula* possess much elegance, and frequently not a little originality, they have the additional merit of having been published in our mathematical periodicals for the instruction and imitation of those students of mathematics who had not the benefit of a university education. If Mr. Lawson was not the actual editor, he had a good deal to do with the mathematical department of the "British Oracle;" for, besides contributing many solutions to the geometrical questions, he also furnished translations of several papers from the foreign "Transactions." Most of these minor efforts bear his signature in full, and the rest are scarcely disguised by being offered to the notice of the reader by the anonymous "J. L."

On the other hand, Mr. Crakelt contributed largely to the pages of the "Oracle." He appears as "Pamphagus" and "Nugo Dargnas" in the "Ladies' Diary;" and although his contributions to the "Miscellanea Curiosa" bear the signature "W. Chartreux," he took advantage of the appearance of this periodical to append to each number a portion of his translation of Clairaut's "Algebra." Throughout the whole of Dr. Hutton's "Mathematical Miscellany," the Constructions and Demonstrations "by the Rev. John Lawson" and "the Rev. William Crakelt" are of frequent occurrence; many of their ingenious questions and solutions also occur in the "Ladies' Diary," of which Dr. Hutton was then the editor, and they assisted very materially in forming the excellent mathematical department in the "London Magazine," conducted by Mr. John Keech. When we consider the extensive influence which the writings of these two able mathematicians exercised in diffusing a love for the study of pure geometry; and when we further call to mind the great amount of assistance they rendered to Dr. Hutton's publications, both anonymously and otherwise, it seems somewhat singular that he should omit all notice of them in the biographical sketches contained in his "Mathematical Dictionary."

Mr. Lawson published the first edition of his translation of Vieta's "Apollonius Gallus" in 1764. It contained a condensation of what had been effected by Vieta, Ghetaldus, Simpson, and himself, towards the restoration of the lost Treatise on Tangencies mentioned by Pappus in the Preface to the Seventh Book of his "Mathematical Collections." The general problem requires the description of a circle which shall be tangential to three given circles, and the construction of this, together with those of its particular cases when points or right lines are substituted for one or more of the given circles, constitute the principal subject of Mr. Lawson's compilation. In a supplement, he proposes "Ghetaldus's Problems over again, without a determination," and finds "the locus of the centre of the circle required," which had not then been "done before in any author." The appearance of this work was hailed with delight by English readers, since it placed within their reach one of the finest speculations of the Greek geometers. Most of the critics of the day spoke favourably of the performance; but the absence of much *symmetry* in the methods of construction employed, did not fail to strike several of the more accurate observers. Amongst these was a writer in the "Monthly Review" for October, 1764, who, after speaking favourably of the compilation, *as a whole*, regretted that some of the "modern solutions of these problems" had not been inserted, which he considered were "more concise and elegant than any that are to be met with in the works of the ancients." The name of the "Reviewer" has not transpired; but that he was equal to his task, is evident from a specimen which he gives in support of his opinions. The article was probably written by one of Mr. Simpson's friends, and a slight deviation from strict accuracy in some of the terms used by the writer, led Mr. Lawson to address the following note to the editors of the "Review."

"May 7th, 1765.

"Gentlemen,—In your 'Review' for October last, you took notice of my translation of Vieta's 'Apollonius Gallus,' and were pleased to speak favourably of my fidelity as a translator, and of my abilities in the science of geometry. You then say, 'But would have wished he had added in his Supplement some of the constructions of the moderns, as many of the most important problems concerning Tangencies are performed in a far more concise and elegant manner than any to be met with in the works of the ancients.' Now, I know not well what *moderns* you can mean; my authors, Vieta and Ghetaldus, cannot be accounted ancients, though they follow the methods of the ancients. Sir Isaac Newton has solved several of these problems in his '*Arithmetica Universalis*,' but has constructed none of them; therefore, I presume, you cannot mean these. Mr. Thomas Simpson's constructions I have taken notice of myself; but they are not so simple as Vieta's. Your have subjoined one construction as a specimen, which I acknowledge to be more

concise than the one I gave from Vieta; but I do not yet see how many of these problems can be constructed by means of it, 'with the utmost facility,' as you say, it being the twelfth of mine, and only the two remaining ones depend upon it, or are capable of being derived from it, so far as I can at present see. What I have, therefore, to request is (and I shall esteem it a great favour), that the gentleman who wrote the article in your 'Review' will be so good as to give himself the trouble to leave a line for me at Mr. Becket's, the publisher, to inform me in what modern authors I may see any of these problems constructed, and particularly where that which he gives us may be found, as I never had the pleasure of seeing it before.

"I am sensible it would give you endless trouble if, upon such representations as this, you should undertake to revise your own articles; but nevertheless, I hope the gentleman will be so good as to oblige me in this one request, as I ask merely for information, and have some thoughts of adding to the little piece already published.

"I am, Gentlemen, yours, &c.,

"JOHN LAWSON."

(To be continued.)

LOCOMOTION ON THE SURFACE OF THE WATER.

WE are indebted to our correspondent, "N. B.," for his able papers on the above subject, in which he has directed the attention of our readers to the absurdity of several modern inventions which have for their object the increasing of the speed of ships. "N. B.'s" illustrations were taken altogether from the productions of French and English inventors; but we find that the Americans, in this, as in other astonishing matters, are not at all in the rear of other countries.

In a February Number of the *Scientific American*, the following appeared, headed:

"*Extraordinary Invention.*

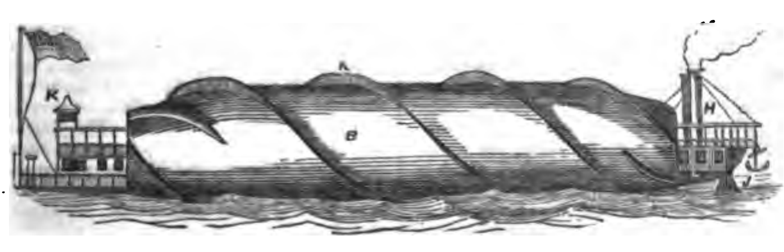
"Messrs. Editors.—While we are every day hearing of new inventions and the progress of reform, I take the liberty to state to the readers of your valuable journal what I have invented and am about to bring before the world at the earliest possible period. For the last four years I have had my mind engaged upon a marine locomotive, and I have succeeded in bringing it to nearly a perfect plan. It is unlike anything now used in navigating the ocean: one of its most important features is the remarkable fact that it has no head-water resistance—thus the speed can be increased in the same ratio as we increase the number of revolutions. I make these statements candidly, and my object is to open the way to give my invention a public demonstration, and if any one has any invention of the same kind, embracing the same principle, let him make it known now, and not wait until the thing is before the public, and then come forward and claim it as his own. If any one has invented a locomotive that will cross the Atlantic in four days without any head-water resistance—let him speak now; if not, let him for ever hold his peace, for I have such an invention, and am ready to prove my statement to any one who will address me post-paid.

"HENRY A. FROST.

"Worcester, Mass., Jan. 18, 1854."

"[Since the above letter was in type, Mr. Frost has furnished us with diagrams of his astonishing invention, from which we shall execute engravings to present to our readers in a few weeks.]"

In a subsequent Number this "astonishing" Marine Locomotive has appeared, and the accompanying engraving represents a



perspective view of it. B is the outer rim or hull, to which are attached the screw-blades, A, the whole case, B, being made to revolve by an internal driver-wheel that travels in a grooved track which forms an endless railway, upon which an interior

case, with its contents, is entirely supported by a number of small wheels. The inner case is made water tight for security, in case of the outer hull becoming damaged, and the interior of it is divided into four compartments, of which the upper one forms a saloon running the whole length of the vessel; the next below it, a cabin, having rows of state rooms on each side; the third, a space intended for freight; and the lower portion, the machine or engine-room. I and H are the smoke and steam-pipes; J, is the rudder; K, the pilot-house; and L L, portions of the cabin connected to the internal cylinder through the opening at the ends, which are to be far enough above the water-line to prevent the water from entering. The interior is lighted from end to end artificially.

"The advantages claimed by the inventor are greater speed, safety, and simplicity of construction. He also claims that his arrangement will be liable to no head water resistance, as he thinks the manner in which the screw-blades enter the water will effectually prevent this. Another gain to be obtained is the freedom from motion, as the inner cylinder, being loaded at the bottom, will continually maintain the same position. Easiness of repair, in case of accident at c, to the outer cylinder, and a simple means of baling and ventilating the vessel, are also enumerated."

We may add, with our contemporary, "As our readers will be able to judge for themselves in regard to this invention, we will say no more concerning it."

ELECTRICAL LOOM.

(Translated, from the *Moniteur Industriel*, for the *Mechanics' Magazine*.)

At its last meeting, the Agricultural Society of Lyons had an opportunity of investigating the merits of a newly-invented application of electro-motive power to looms for weaving silk. This discovery is due to two young natives of Lyons, Messieurs Pascal and Mathieu. It has, doubtlessly, not been forgotten that the newspapers recently published a description of Jacquard machinery working by electricity. The basis of Bonelli's invention consists in substituting for the ordinary Jacquards a metallic blade or plate, the surface of which is divided by the graver, into small squares, in which the pattern desired to be produced on the fabric is traced in a varnish which is a non-conductor of electricity. This metal plate or blade is placed above a transverse row of needles, which carry the threads or warp, and to which the plate, during its graduated rotation, presents the various parts of the pattern traced on its surface. The electro-magnets, set in work by a Bunsen apparatus, act on the metallic plate or blade, and raise it, and, with it, the needles corresponding to those squares on its surface which are not covered with the non-conducting varnish, while the needles which come in contact with the insulating substance remain stationary, and are moved by the treadle. The electricity maintains a constant action. The metallic plate advances one step with every single movement which the workman applies to the treadle; the motion of which is always the same, while that of the needles varies according to the pattern to be produced.

M. Bonelli's plan necessitates a somewhat large expenditure of electricity, which, however, is avoided in the apparatus submitted to the Lyons Agricultural Society. As far as respects the utilization of electro-motive power, their plan appears a happy one. In all mechanical contrivances, the economization of power is one of the most important problems to be solved; and this essential condition appears to have been satisfactorily arrived at in the model worked in our presence. The copper blade in which the pattern is traced, is placed in a vertical position, and laterally in respect of the hooks which carry the threads. It turns in a cylinder, without, however, completely shifting its position. The unhooking is effected through the influence of the electrical current, by a slight rotary movement imparted to the hooks on their axis, which slips them away from the ring which keeps them stationary. The threads which were carried by the hooks which remained stationary are then raised by the treadle. The only use of the electro-magnets here, is to impart to the hooks corresponding to these divisions of the plate which are not covered by varnish, a see-saw or slightly oscillating movement at each motion of the treadle, an operation which only necessitates a trifling expenditure of power. This appears a very ingenious application of electrical power, in which simplicity and regularity are combined with economy. The young inventors hope to be enabled, with machinery constructed on these principles, to execute all that the Jacquard looms effect at present. We trust they will succeed. The difficulties to overcome do not appear to us either numerous or heavy, and Messrs. Pascal and Mathieu are entitled to the favourable opinion of their fellow-citizens for the results they have already attained.

The Society could not immediately decide upon the value of their invention, but delegated the duty of examining it in detail to a commission composed of some of their

members, comprising manufacturers and persons acquainted with physical and mechanical science.

The Society has reason to congratulate itself, not only on this new step in one of the most important of French manufactures, but also on being enabled to attribute it to two natives of Lyons.

PRIDEAUX'S PATENT SELF-CLOSING FURNACE-VALVE.

The object of Mr. Prideaux's invention is to prevent the effusion of smoke from furnaces, to economise the use of fuel, and to reduce the temperature of the engine-room in which it is employed. It has, at the command of the Lords of the Admiralty, been made the subject of a series of very satisfactory experiments at Portsmouth Dockyard. It consists of an apparatus to be affixed to the fire-doors of furnaces for the purpose of regulating the admission of air, and of stopping the radiation of the heat outwards. All that is necessary for its application is to insert and fix the apparatus either in an aperture formed for the purpose in the fire-door, or in a door, consisting merely of a frame, cast for the purpose.

Fig. 1 represents a front elevation of the valve as fixed to the furnace-door, and fig. 2 a sectional plan of the same. Fig. 3 is a cross section of the valve and furnace-door, and fig. 4 a cross section of the cylinder.

Fig. 1.

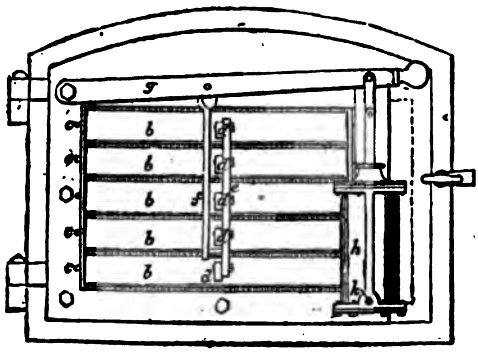


Fig. 4.

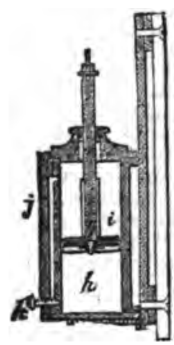


Fig. 2.

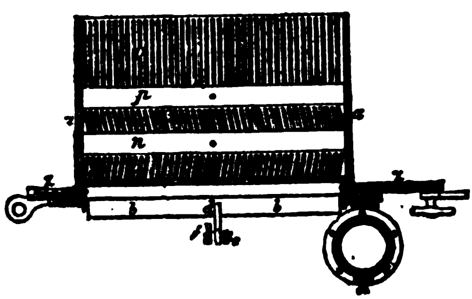
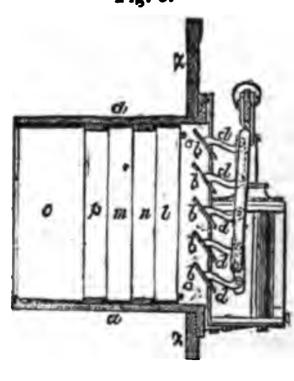


Fig. 3.



The front of the apparatus, which constitutes the panel of the furnace-door, consists of a series of shutters, *b*, traversing in axes, *c*, so as to be capable of opening and shutting like Venetian blinds. Behind these moveable valves or shutters, is a series of

parallel plates, *l*, fixed at a slight angle, and then a second series, *m*, fixed at an opposite angle, and then a third and wider series of parallel plates, *o*, which do not incline, with air-spaces, *n, p*, between each series.

By means of the slight inclination in opposite directions given to the first and second series of plates, *l m*, the direct radiation of heat from the fire outwards is prevented, although the air has free ingress, and the inclination being at an angle to the axis of the line of draught, has the further effect of causing the current of air slightly to impinge upon the surface of the plates in its passage, by which means the heat is more effectually extracted.

So well does the above arrangement of plates and air spaces answer the object for which it was planned, viz., that of isolating the heat radiated against the inner surface of the fire-door, so as to confine it in the interior, and prevent its passage outwards, and thus ensure the whole being transferred to the entering current of air during the periods at which the valve is open—that after the shutters have been closed a few minutes, and the innermost row of plates have become red-rot, a thermometer with its bulb in contact with the face of the shutters stands at only 64°.

The gradual self-closing of the shutters, which constitutes an important feature of this invention, is produced as follows:—Each shutter has attached to it an arm, *d*, which at its other end is attached by a pin-joint to the bar, *e*, to which motion is imparted by a rod, *f*, attached at its lower end by a pin-joint to the bar, *e*, and at its upper end by a pin-joint to the lever, *g*, the gradual descent of which, in any required time, is effected by its being connected with a piston, *i*, traversing a water cylinder, *h*, which piston, by means of a suitable valve, allows a free passage to the water from above to below, but resists its passage in the opposite direction;—when the water is forced by the gravity of the lever, piston, and their appendages, from below to above, through the narrow channel, *j*, the size of which at the bottom is adjusted, by the screw, *k*, so as to regulate the time of the passage of the water, and the consequent descent of the piston and closure of the shutters, with the greatest nicety.

The first valve made was, in the experiments before referred to, tested from one minute to twenty minutes, and its performance found equally satisfactory at all stages; whilst in practice, a range of from five to eight minutes is all that is required.

ELECTRIC TELEGRAPH INSULATOR.

At the February meeting of the Franklin Institute at Philadelphia, Dr. Turnbull called the attention of the meeting to the very great importance of proper insulation of the metallic wires of the electro-magnetic telegraph. He exhibited two new forms of insulators. The first was a modification of the form designed by J. M. Batchelder, Esq., of Boston,* but omitting the use of iron, and being composed of flint, quartz, and feldspar, very compact, thoroughly vitrified on the surface, was equal to the best forms of glass insulators, and much stronger; it is in the form of a cap with a ridge for the purpose of fastening the wire, and an inverted edge so as to divert the rain downward, and prevent it from entering the inside of the cap. He remarked, that even this form of insulator is defective, and the moisture settles upon it, and this acts as a carrier of the electricity to the ground. A still further modification of this apparatus is desirable, so as to give the surface of the insulator a downy covering, to cause the moisture to remain in isolated dress upon it; this, Mr. Batchelder is endeavouring to accomplish. He has also produced a change by heat, &c., in the best electric substance known, namely, caoutchouc, so as to render it impervious to moisture, heat, and rapid decomposition, and fit it for insulating caps for the tops of posts.

The composition is of a dark colour, and in the form exhibited has a ringing noise when struck. Subjected to water at 212° it did not soften; strong sulphuric acid had no action upon it; even pure nitric acid did not destroy its elasticity, while it completely altered a piece of pure caoutchouc, converting it into a mass of brown colour, which, when pressed between the finger, falls to powder. The only change noticed was its colour, which was yellow instead of black. When placed in the flame of gas it burned with freedom, giving off scintillations as if combined with metallic oxide, leaving a polished surface, while ordinary caoutchouc liquid, when burned, produced a pyro-oil which stains the fingers, so that it has all the qualifications of a good insulating substance, being an electric not affected by a heat of 212°, not altered by acids, and not liable to decomposition.

THE INVENTION OF THE SCREW PROPELLER.

To the Editor of the Mechanics' Magazine.

Sir,—In September, 1845, I addressed

* See *Mech Mag.*, vol. lvi., p. 351.

you on the subject of the Screw Propeller, and from a passage I met with in Bishop Heber's Journal (page 219, vol. ii.), I was led to believe that Mr. Smith, although the patentee, was not, as has generally been supposed, the first to apply the Archimedean screw to the purposes of propulsion; but that an English engineer in the pay of the King of Oude, in 1824 or 1825, had the greater claim to the original idea.

Since I made this communication to you, though years have passed away, I have noticed no reply to my supposition, nor indeed could I ascertain decidedly from any quarter, who was entitled to the distinguished merit of first applying the screw principle as a propeller to vessels. Judge, then, how gratified I was when some few months after my return from India my eye caught sight of a satisfactory solution to the whole question in the following letter, which appeared in the *United Service Gazette* of the 28th May, 1853:

"*To the Editor of the U. S. Gazette.*

"SIR,—From day to day, I observe in the daily papers, under the 'Naval Intelligence,' an account of some vast ship laid down, launched, or tried, fitted with the screw propeller of the patent of Mr. This, or the improved patent of Mr. That, and am proud that the defences of our country are at last, as to naval matters, being placed upon a proper footing. But I think that the credit of the adaptation of the screw-propeller to steam vessels ought to be ascribed to the real inventor, and that the name of an officer to whom his country is so largely indebted ought not to be unknown. The idea of this invention first occurred to my father, the late Major Frederick Du Vernet, of the Royal Staff Corps, and late Deputy Quarter-Master-General of Ceylon, about the year 1819, who, after spending much labour and time upon various plans, at last constructed a working model which was frequently tried with every success on the Royal Military Canal at Hythe, in the presence of the officers of his corps, and other officers of distinction, and the inhabitants of Hythe. Shortly after this my father was ordered to Ceylon, and died soon after, on his return home, from effects of disease contracted by the arduous duties he had to perform in that climate.

"In the year 1842, or thereabouts, a patent for this invention was, I believe, claimed by a Mr. Smith, who is the son of the late postmaster at Hythe, of which place Mr. Smith is also a native, and was resident there at the time my father tried his invention; consequently he had every opportunity of witnessing the operations above alluded to. Many of the officers of my late father's corps are aware of these facts, including the late Colonel Sir James Colleson and Major White, and some of them have already given their testimony to the above effect, and others would, I doubt not, readily come forward if it were necessary; but all I desire now is, to place the facts before the public, in order that my father's memory may receive that meed of honour which, had he lived, would doubtless have been awarded him. Trusting that you will, through the wide circulation of your Journal, aid me in this filial endeavour,

"I remain yours very faithfully,
(Signed) "WILLIAM DU VERNET,
"Captain 67th Regt.

"The Heights, Dover, May 24, 1853."

Besides this letter, there is also the evidence of Col. Sir Jas. Colleson and Major White to be seen on reference to the *United Service Gazette* of the above date. Thus, I think, you will agree with me that the whole matter is set at rest—that the late Major Frederick Du Vernet was the original inventor of the Archimedean screw applied as a propeller to vessels, and that Mr. Smith, if he aspire to the original invention of the screw-propeller, robs the orphans of the late Major Du Vernet of the just merits of their father, and thereby deprives them of any remuneration the Government might be pleased to bestow upon them hereafter, in consideration of the important service rendered to the navy by the invention.

It will hardly be necessary for me to add, that I do not write from any interested motives;—with me it has been a simple inquiry after truth, joined to the wish of rendering "honour to those to whom honour is due."

I am, Sir, yours, &c.,
T. D. L.

Jermyn-street, St. James's, March 16, 1854.

SUGGESTIONS ON STEAM NAVIGATION.

To the Editor of the Mechanics' Magazine.

SIR,—I request permission to suggest, through your pages, that in the construction of steam-ships, whether for river or ocean navigation, the combined use of the screw and paddle in the same vessel would tend to the following results:

1. Greater average speed with the same expenditure of steam; as well for other reasons, as especially because of the application of the paddle and screw to distinct masses of quiescent water.

2. Greater uniformity of speed, taking into account calm and storm, side wind and wind fore and aft.

3. Diminished vibration, and diminished

pitching and tossing of the vessel; the different impulses tending to neutralize each other, and also to modify in some measure the action of the waves on the hull.

4. Diminished risk of serious injury, arising from sudden stoppage of the vessel, often rendered necessary by derangement of machinery; since either the screw or the paddle would keep the ship in its course during the suspended action of the other.

5. Less standing rigging required; and, indeed, wherever fuel is readily accessible, and expense no object compared with speed, all masts and rigging might be dispensed with.

6. Diminished strain upon the timbers, and less wear and tear of the whole vessel; which, on the present plan, is made to quiver incessantly under the effort of propulsion from one point in the whole length.

I have little doubt that at least 50 per cent. might be gained in average speed, in proportion to the fuel consumed, by judicious combination of screws and paddles. Whether an absolute increase in speed to that amount is attainable is quite another question, obviously depending on the means of neutralizing the increased resistance of the water. But I have long observed that the present method of applying steam power to navigation is most wasteful. It is as if one should substitute for eight oars in a galley two oars of four-fold size, wielded by arms of four-fold power, which would lose no small part of their force by the commotion and recession of the water on which they impinge, as well as by the yielding and vibration of the boat's frame and planking. The water, regarded as fulcrum to the oar, paddle, or screw, ought to be as far as possible quiescent; and for this purpose the force applied to it for pushing on the vessel ought to be applied in several places instead of in one or in two. A fish, which has the resistance of the same medium to overcome, effects its far more rapid progress, by dint of fins and tail combined, and also by a spiral and muscular motion throughout its whole length. It swims all over; using for fulcrum every particle of water with which the several portions of the whole surface of its body successively come in contact. An ancient galley, bristling with its many tiers of oars, and propelling from scores of distinct fulcra in the water, was more scientifically constructed, in this point of view, than the modern steam-boat; which is so contrived, that all the force is brought to bear in one place or in two places at the most, and is there applied with such wasteful vehemence of action, that the water is fast receding from the blow of one float of the paddle, or from the thrust of each preceding portion of the screw, as the next begins to push off from it. C. G.

Kingwinford Rectory, March, 1854.

EXTINGUISHING FIRES.

To the Editor of the Mechanics' Magazine.

Sir,—I beg to be allowed to suggest, through the pages of your interesting Magazine, the necessity of some apparatus being invented for the purpose of conducting the extremities of engine-hoses much nearer to buildings on fire than they are ordinarily placed. On the occasion of the late fire at the *papier maché* works in the Strand, it was painful to witness the inefficiency of most of the fire-engines employed, in consequence of the want of such an apparatus. I have frequently observed the same thing at conflagrations in the provinces. The stream of water issuing from the engine seldom maintains its compact form until it reaches the building; and it very frequently happens that when attempts are made to play into the apartments on fire, the rush of flame from the window bears away, in the form of spray, the whole of the water, which, if preserved in a compact stream, would exert an important influence in staying and subduing the fire.

I cannot help thinking that some of your ingenious mechanical correspondents will have the humanity to design an apparatus of the description I have pointed out. I do not think there will be any insuperable difficulties opposed to such an undertaking, especially when I remember that it will probably require less ingenuity to devise, and less labour to employ a machine that shall carry the end of a hose to a suitable position than has already been expended in designing and operating the fire-escapes which are already plentifully supplied throughout London, as Mr. Baddeley has shown in his valuable Report on London Fires, lately published by you.

I am, Sir, yours, &c.,

Homo.

London, March 21. 1854.

MATHEMATICAL PROBLEM.

To the Editor of the Mechanics' Magazine.

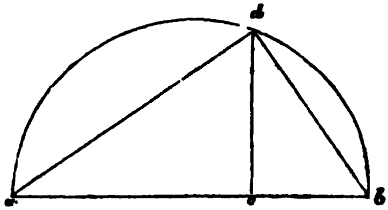
Sir,—If the accompanying curious problem is deemed by you worth insertion in the next number of your Magazine, I will for a succeeding number furnish you with a very useful practical application of it, and remain, Sir, your

Constant Reader.

London, March 25, 1854.

Problem.

Raise a perpendicular, *c, d*, on any point *c* in the diameter *a b*, of a semicircle, dividing it into two segments, *a c*, *c b*, and complete the two right-angled triangles by drawing the cords, *a d*, *b d*. In either tri-



angle the square root of the bases, *a c*, *c b*, will be expressed by one-tenth of the respective hypothenuses, *a d*, *b d*, when measured on a scale of equal parts, of which the diameter, *a b*, of the semicircle is equal to 100.

THE USE OF GAS IN DWELLINGS.

To the Editor of the Mechanics' Magazine.

Sir,—If your correspondent "Clericus," in the *Mechanics' Magazine* of March 18th, will communicate with me, he may hear of and investigate a plan for "the use of gas in dwellings, *cheap, easily adapted, and not such an eyesore as to forbid its use;*" but, on the contrary, of such a nature as to make us wonder how we have lived so long in such an uncivilized state as at present. I am, Sir, yours, &c.,

J. Avery.

5, Cloudesley-square, London.

P.S. The plan is also applicable to your friend "Edward Cocks'" requirements, and much more simple than his.

DISCOVERY OF PURE ALUMINIUM.

The following remarks occur in a letter of Mr. C. M. Willich's, just published in the *Journal of the Society of Arts:*

"The result of the experiments lately made in France by M. Deville, to obtain a metal from argillaceous earth, has been highly successful. It is true that M. Wöhler discovered the metal *aluminium* in his researches in 1828 and 1846, but the metal he describes did not melt except at a very high temperature. The pure metal now introduced to the world by M. Deville, is stated to be as white as silver, malleable, and ductile. In tenacity it approaches iron. The melting point differs little from silver; in density it is only 2·56, or about that of glass and flint; it does not sensibly oxidise when melted and cooled in the air; it is a good conductor of heat; it is unalterable in dry or humid air; it is insensible to the action of sulphuretted hydrogen, or to hot or cold water, or weak or concentrated nitric acid, or weak sulphuric acid. Muriatic acid appears to be its true solvent.

"M. Deville has announced that he is making further experiments, in order that the metal may be obtained in sufficient quantity to be available in the arts and manufactures.

"The discovery of an easy mode of procuring this *noble* metal from clay, which is so abundant in the world, would open the way to fame and fortune for the discoverer. The following simple experiment has been made by M. Chapelle, who, as soon as he heard of M. Deville's discovery of the pure metal aluminium, made the following trial:—He introduced pulverized clay, with marine salt and powdered charcoal, into a common crucible, and heated it in a reverberatory furnace by means of coke, but he did not succeed in obtaining a white heat. After cooling, the crucible was broken, and in the mass a considerable quantity of small globules (about half a millemetre in diameter, or about 1-50th of an inch,) were found, of the colour of silver. He did not ascertain if these globules were quite pure; he, however, states, that they were insoluble in cold nitric acid, but were soluble in muriatic acid heated to 60°."

The Electro-Magnetic Telegraph: with an Historical Account of its Rise, Progress, and present Condition. Also, Practical Suggestions in regard to Insulation; and Protection from the Effects of Lightning. By Laurence Turnbull, M.D., Lecturer on Technical Chemistry at the Franklin Institute. Second Edition. Illustrated by numerous Engravings. Philadelphia: A. Hart. London: Trübner and Co., Paternoster-row, 1853.

This edition of Dr. Turnbull's valuable work contains many new facts derived from various sources. The views of Henry, Baumgartner, and Steinheil, upon the action of Atmospheric Electricity upon the Telegraph are added, accompanied by descriptions of the means to be employed in obviating its evil effects. The author has also added an important chapter on the subject of Insulation.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

JOHNSON, WILLIAM BECKETT, of Manchester, Lancaster, manager for Messieurs Ormerod and Son, engineers and iron-founders. *Improvements in steam engines and the apparatus connected therewith.* Patent dated August 31, 1853. (No. 2022.)

Claims.—1. A peculiar combination of engine and boiler, in which the cylinder is attached in a vertical position, or nearly so, to a steam boiler having its furnaces and tubes, or flues, placed horizontally, or nearly so. 2. Placing the condenser in or in communication with a space contained between two air-pump buckets or pistons. 3. Forming in regulator valves a series of apertures, which shall come into operation successively, or otherwise constructing the valves in such manner that the variation in area shall take place at an accelerated rate, while the action of the governor upon the valve is uniform. 4. Placing a valve inside of the plug of a feed-water tap, so that it shall rise with each quantity of water supplied to the boiler, but prevent any return of the water from it. 5. Constructing the pump and valve of small engines, used expressly for feeding boilers, similarly to an ordinary "three passaged" steam-engine cylinder.

ILIFFE, HENRY JEREMIAH, and JAMES NEWMAN, of Birmingham, Warwick, manufacturers. *Improvements in the manufacture of buttons.* Patent dated August 31, 1853. (No. 2023.)

Claims.—1. The manufacture of covered buttons composed solely of composition, or of composition in combination with single or double metal shells. 2. Covering composition buttons with raw or unmanufactured fabrics, such as hair, floss silk, cotton, or swan's down. 3. A method described for ornamenting sewn-through covered buttons.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent agent. *An improvement in paddle-wheels.* (A communication.) Patent dated August 31, 1853. (No. 2025.)

We shall shortly publish a full description of this invention.

OXLAND, ROBERT, of Plymouth. *Improvements in the manufacture of manure.* Patent dated September 1, 1853. (No. 2027.)

Claim.—A peculiar use of sulphuric acid, and the employment of superheated steam, heated air, or the products of the combustion of coke or other fuel, for the conversion of refuse animal matter into a form suitable for employment as a manure.

HINKS, JOHN, and GEORGE WELLS, of Birmingham, Warwick, manufacturers and co-partners, and FREDERICK DOWLER, of Birmingham, aforesaid, machinist. *New or improved machinery to be used in the manufacture of metallic pens and pen-holders.* Patent dated September 2, 1853. (No. 2028.)

Claim.—"The construction of machines for giving a semi-cylindrical figure, or a figure partially cylindrical and partially semi-cylindrical, to metallic pens; and giving a cylindrical figure to the metallic part of penholders; and impressing inscriptions and devices upon metallic pens and the metallic parts of pen-holders by means of dies actuated by levers, the said levers being actuated by cams."

TAYLER, JOHN, of Manchester, Lancaster, engineer, JAMES GRIFFITHS, of Wolverhampton, Stafford, engineer, and THOMAS LEES, of Stockport, Chester, machinist. *Certain improvements in steam-boilers, and in apparatus applicable thereto, and to be used therewith.* Patent dated September 2, 1853. (No. 2029.)

The inventors describe, as one main feature of their invention, a method of rapidly cooling boilers, which consists in establishing a temporary communication between the interior of the boiler and a furnace-flue, in which a sufficient draught exists for the purpose, and, at the same time, admitting air into the boiler by another opening. The flue with which the communication is made may be either that of the furnace of the boiler to be operated upon, or of an adjoining one. By these means a current of air is drawn into, and rapidly circulated through, the boiler, carrying off with it the heated air and the vapour generated within the boiler by the residuary heat and moisture, and thereby rapidly abstracting the heat and lowering the temperature.

PRITCHETT, JAMES PIGOTT, the younger, of York, architect. *Improvements in window-sashes and shutters.* Patent dated September 2, 1853. (No. 2031.)

Claim.—A method of hanging shutters or sashes, so that their parts may be made to balance each other, and act simultaneously with greater ease and less friction than when hung separately, the suspension being effected by means of cords, chains, or ropes passed over pullies and placed in the side boxes of the window-frames, out of sight.

CAROSIO, AUGUSTINO, of Genoa, now of Connaught-square, Middlesex, doctor of medicine. *Improvements in obtaining power by the aid of an electric current for motive and telegraphic purposes.* Patent dated September 2, 1853. (No. 2032.)

This invention consists in employing the electric current obtained from an apparatus acting upon the principle of Grove's Gas Battery, for setting in motion any suitable magnetic apparatus.

WALKER, THOMAS, of Birmingham, Warwick, engineer. *Improvements in rotary engines to be worked by steam or other fluids.* Patent dated September 3, 1853. (No. 2037.)

These improvements relate to that description of rotary engine in which the piston is cylindrical, and rotates eccentrically within its case; and in part they consist in means of combining with such engine a sliding stop or abutment, whose thickness is not less, or not much less, than twice the distance from the centre of the piston to the centre of the case in which it revolves, or whose thickness is not less, or not much less, than the distance it has to travel.

NAGLES, ALBERT, of Ghent, Belgium, chemist. *Certain improvements in machinery or apparatus for washing, bleaching, drying, and dyeing woven fabrics.* Patent dated September 3, 1853. (No. 2038.)

The inventor passes the fabric to be acted upon over series of rollers placed in a cistern containing the washing material, and in an adjoining kier he places beaters, which revolve rapidly and act against the surface of the cloth; nipping-rollers being placed at convenient intervals, to draw the fabric through the machine.

STICKNEY, GAGE, of Hanover-street, Pimlico, Middlesex, mechanical engineer. *An improved construction of blower.* (A communication.) Patent dated September 3, 1853. (No. 2039.)

In this invention, a fan having pointed blades somewhat like the flukes of an anchor, is mounted in the centre of a circular case, which is open at the sides to allow of an indraft of air as the fan rotates, and is provided at its periphery with an annular chamber, into which the air is thrown, and from which it is led off to be employed as circumstances may dictate.

STICKNEY, GAGE, of Hanover-street, Pimlico, Middlesex, mechanical engineer. *Improved machinery for forging metal.* (A communication.) Patent dated September 3, 1853. (No. 2040.)

This invention consists of an arrangement of machinery wherein forge hammers or dies are raised to any desired elevation, and guided in their descent, so that by one blow the heated metal under operation may be struck into the required form; or when the work is more complex, the metal is subjected to different dies or hammers in succession to bring it up to shape at one heating.

CLARE, JOHN, jun., of Liverpool, Lancaster, product-broker. *Improvements in the construction of iron houses, vessels, masts, spars, smoke-funnels, boilers, cylinders, beams, and other like structures or articles.* Patent dated September 5, 1853. (No. 2042.)

This invention relates—1. To a peculiar mode of attaching iron plates to skeletons or frameworks; and 2. To a mode of connecting such plates to each other in cases where framework is dispensed with.

SMALLEY, JOHN, of Bishopgate, Wigan, Lancaster, accountant, and WASHINGTON SMIRK, of Ince, of the same county, smith. *An improvement in railway carriage-axles.* Patent dated September 5, 1853. (No. 2043.)

This invention consists in mounting each railway wheel upon an independent axle, so that the velocity of the near and off side wheels may be different when passing round curves.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improvements in breech-loading guns.* (A communication.) Patent dated September 5, 1853. (No. 2046.)

This invention consists in a method of unscrewing and withdrawing the breech from the barrel, and of turning the former up, so as to bring its chamber into a vertical position for loading, after which it may be returned into the barrel and the two locked together, the several motions being performed through the intervention of appropriate cams, catches, and springs, acted upon by a single lever worked by the hand of the gunner.

UPFILL, THOMAS BOLLMANN, of Birmingham, Warwick, manufacturer, and WILLIAM BROWN, foreman to the said Thomas Bollmann Upfill. *An improvement or improvements applicable to metallic bedsteads, couches, chairs, and other such articles as are or may be used for sitting, lying, and reclining upon.* Patent dated September 6, 1853. (No. 2047.)

This invention consists in attaching the laths to the framing of the articles enumerated in the title, by causing hooks or tongues, formed out of the said framing, to take into holes made in the laths.

WRIGHT, LEMUEL WELLMAN, of Charlford, Gloucester. *Improvements in reaping and gathering machines.* Patent dated September 6, 1853. (No. 2048.)

Claim.—A peculiar construction of scythes or reapers, and of gatherers, for receiving and carrying the cut corn back upon the machine, where it is laid in a horizontal position upon rakes, which are caused to tilt and deposit it at regular intervals upon the ground.

WILKINSON, HENRY, of the firm of Messrs. Wilkinson, brass foundry, Tottenham-mews. *Improvements in the construction of air furnaces, parts of which improvements are applicable to other furnaces.* Patent dated September 6, 1853. (No. 2051.)

One part of this invention relates to a mode of coating the furnace with glass grinders, sand, fire-clay, or other non-con-

ducting material; and another part refers to the arrangement of the bars that support the fuel, which instead of being fixed, as are those in ordinary use, are moveable and attached to an arm or lever, so that the fuel can be discharged at once from the furnace and the heat stopped.

DAVIS, JAMES, of the Low Furness Iron Works, near Ulverston, Lancaster, iron-master, and ROBERT RAMSAY, of the same place, engineer and fitter. *An improved engine to be worked by steam, air, or water.* Patent dated September 6, 1853. (No. 2052.)

This engine consists of a cylinder provided internally with two or more fixed steam stops, projecting radially from the sides of the cylinder towards the centre, and a central shaft, which passes through the cylinder, and is mounted in such manner as to fit steam-tight against the inner edges of the stops. This shaft is provided with radial pistons, which are fixed thereon and correspond in number to the spaces between the stops, so that the cylinder is divided internally into compartments or chambers, each of which is provided with a piston secured to the main central shaft, and is made to vibrate in its chamber when steam is admitted through suitable valves at the end of the cylinder. On one end of the central shaft is mounted a crank or lever, which by means of a connecting-rod communicates motion to another crank on the shaft to be driven.

POPE, THOMAS, and EDWARD BUFTON, both of Birmingham, Warwick. *Improvements in buttons, and which improved buttons they propose to designate by the name of "Buffalo Buttons."* Patent dated September 6, 1853. (No. 2053.)

This invention consists in manufacturing buttons of the horns of the ox species; and instead of making them in dies by means of pressure, the inventors propose to turn them in a common lathe, or in such a lathe as is employed for turning bone or wooden buttons.

SOMMERVILLE, ALFRED, and CHARLES TWIGG, of Birmingham, Warwick. *Improvements in penholders, and which said improvements are applicable to the manufacture of umbrella and parasol sticks, cornice poles, and other such like articles.* Patent dated September 6, 1853. (No. 2054.)

Claim.—The application of paper in a semi-formed state, or of paper-pulp to the manufacture of the articles enumerated in the title, whether such be made by rolls or by dies and pressure directly applied.

SMITH, ISAAC, of Birmingham, Warwick, machinist, and ALFRED SOMMERVILLE, of Birmingham, aforesaid, merchant. *Improvements in metallic pens and penholders.* Patent dated September 7, 1853. (No. 2055.)

Claims.—1. Constructing sliding saddles for regulating the elasticity of metallic pens. 2. Giving elasticity to penholders, formed of wood, metal, or other substance, by making grooves, ornaments, or devices thereon, by cutting or otherwise removing a portion of the substance of which the said holders are made.

ALSOP, JOSEPH, of Huddersfield, baker, and EDWARD FAIRBAIRN, Kirkler's-mills, Mirfield, York. *Improvements in baking bread.* Patent dated September 7, 1853. (No. 2056.)

Claim.—Baking bread upon one or more revolving metallic cylinders heated by coal, coke, or gas; and certain machinery to be employed for that purpose.

LAW, DAVID, of Glasgow, Lanark, North Britain, and JOHN INGLIS, of the same place, iron-founders. *Improvements in moulding or shaping metals.* Patent dated September 7, 1853. (No. 2058.)

Claims.—1. A mode of adjusting core-bars to various diameters by means of links or levers having an angular elbow, or knee-joint action. 2. The use of certain angular or inclined guide surfaces. 3. A mode of staying or binding collapsible core-bars, by means of longitudinal stay-rods passed through the interior of the core-bars.

SMITH, WILLIAM JOSEPH, of Stretford, Lancaster, salesman. *Certain improvements in buttons or other such fastenings, and in applying or affixing them to wearing apparel.* Patent dated September 7, 1853. (No. 2059.)

Mr. Smith's improved button may be made of metal or other material, and is either hollowed out or flat, having one large hole in the centre of it. It is to be attached to the wearing apparel by means of a hollow rivet and washer. The rivet may be either formed with a flange, or simply tubular, the neck of it being passed through the hole in the centre of the button, and through the material to which the latter is to be affixed. The washer is placed over the end of the rivet at the back of the cloth, and the whole is then closed together by compression.

GRIMSHAW, WESTON, of Morsley, Antrim, Ireland, and ELLIS ROWLAND, of the same place. *Improvements in the manufacture of bricks.* Patent dated September 7, 1853. (No. 2060.)

The object of this invention is to make bricks of dry clay by compressing it in a mould; and the improvements consist, *firstly*, in the use of a piston in a steam cylinder acting directly on a pallet or die, which forms the bottom of a mould; and, *secondly*, in the use of blocks or pins

in combination with such piston for the formation of perforated or indented bricks.

HUSTWAYTE, BENJAMIN, of Hockley-street, Homerton, Middlesex, bricklayer, and RICHARD JOHN PAUL GIBSON, of Upper Brunswick-street, Hackney, builder. *An improved composition or compositions applicable to the manufacture of bricks, tiles, and other moulded articles.* Patent dated September 7, 1853. (No. 2062.)

This invention relates to the manufacture and use of a new plastic composition, which when moulded into bricks or other such articles, will set quickly, and require no firing to render it capable of resisting the action of the atmosphere. In making this composition, the inventors employ fine river or well-washed sand, or ballast, as the body or chief ingredient, and add to it, in a dry state, blue lias lime, or Dorking lime, and Portland or Roman cement.

LYNDE, JAMES GASCOIGNE, jun., of Great George-street, Westminster, civil engineer. *A pressure-governor, or self-acting apparatus for regulating the flow of water.* Patent dated September 8, 1853. (No. 2064.)

Mr. Lynde's apparatus regulates the flow of the fluid by its pressure acting on two connected pistons or surfaces of the same or different areas, which pistons or surfaces are also acted upon by a float that rises and falls with the fluid in a reservoir or other receptacle; the check to the passage of the fluid being made either sudden or gradual, according to the shape of the openings in that part of the apparatus in which the pistons act.

HARRINGTON, ROBERT, of Witham, Essex, watch-maker. *Improvements in umbrellas and parasols.* Patent dated September 8, 1853. (No. 2065.)

The object of this invention is to bring the middle part of an umbrella or parasol conveniently over the head of the person using it. For this purpose, the stick or handle is made either with a bend near its upper end, or capable of being bent there, while it may, nevertheless, remain as a straight stick or handle, if necessary.

COATE, JAMES, of Marylebone-street, Regent-street, Middlesex, brush manufacturer. *Improvements in tooth, nail, and hair-brushes.* Patent dated September 8, 1853. (No. 2068.)

Claim.—The adoption in the manufacture of such brushes of a cement, resembling bone or ivory in colour, which shall be insoluble in boiling water and tincture of myrrh, under ordinary use.

HALL, WILLIAM, of the Colliery, Castlecomer, engineer. *Improvements in the conversion of peat into charcoal.* Patent dated September 8, 1853. (No. 2070.)

The main feature of this invention consists in the combination of a cylindrical burner for the peat, with a conical mill, in which the same may be crushed or pulverized, such burner and mill being made to revolve by the agency of power communicated to the latter, which is also contained in a fixed cylinder, around which and within the mill is maintained a constant circulation of cold water, provision being made for the escape of the heated water and vapour, as required.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *Certain improvements in lighting or consuming the carbon escaping combustion in ordinary flames.* Patent dated September 9, 1853. (No. 2071.)

Claim.—Arrangements for causing the air necessary for combustion to arrive from above the lamp, and be heated before reaching the flame; and for regulating the supply of air.

RADFORD, JONAS, of Cheltenham, Gloucester. *Improvements in clocks or time-keepers.* Patent dated September 9, 1853. (No. 2072.)

This invention consists in constructing a "geographical clock," in which is the usual dial or clock-face, marked with figures from 1 to 12, and immediately below this a band or chain, having thereon a series of numeral figures. Under this band is the map-plate, on which is a space for engraving the names of cities, towns, or other designations, as may be desired; and below this space is engraved (on Mercator's projection) the map of the whole or any part of the world. As the usual wheel-work moves, giving on the dial the correct time of any given place, the band or chain aforesaid having the hours and minutes engraved thereon, is moved or carried by suitable works, so as to indicate the time at all other places.

LUMBY, EDWIN, of Halifax, York, ironmonger, and ZACCHŒUS SUGDEN, of Halifax, tin-plate worker. *Improvements in needles or wires used in the manufacture of carpets, looped-piled fabrics, and velvets.* Patent dated September 9, 1853. (No. 2075.)

One part of this invention consists in forming the eyes of the needles employed in the above-named manufactures separately from the needles, so that they may be replaced when necessary. Another part consists in applying a separate piece of steel of a suitable form for the cutting edge, and affixing the same to the wire by brazing or otherwise, by which arrangement increased strength and capability for wear are obtained, and the cutting edge may readily be replaced when required. The improvements also relate to shaping the end of the wire or knife into a pointed form, the point

being towards the centre of the height of the enlarged end of the wire to facilitate its passage between the warps, and to prevent cutting during insertion.

PARNELL, MICHAEL LEOPOLD, of the Strand, Middlesex, lock - manufacturer. *Improvements in the construction of locks.* Patent dated September 9, 1853. (No. 2076.)

These improvements consist of an improved detector stop; of improved stops to resist pressure exerted on the bolt endwise, or in the direction of its motion; and of an improved curtain for preventing the introduction of several picks at one time to act upon the levers or tumblers.

BELL, ISAAC LOWTHIAN, of the Washington Chemical Works, Newcastle-upon-Tyne. *Improvements in the manufacture of sulphuric acid.* Patent dated September 9, 1853. (No. 2079.)

Claim.—The manufacture of sulphuric acid from factitious pyrites by making the same into a paste, drying this paste so as to form thin cakes, and afterwards burning these cakes in suitable kilns.

ASKEW, CHARLES, of Charles - street, Hampstead-road, Middlesex. *Improvements in baths.* Patent dated September 9, 1853. (No. 2080.)

This invention consists of an arrangement for heating the water for a bath. Under the bath is placed or fixed a heating apparatus to contain a small quantity of water, made of flat plates, with very small spaces between them, and having holes through them for the heat to pass up to the bottom of the bath, which is of metal. The water of the bath circulates through this heating apparatus by means of pipes descending into it.

MOTAY, CYPRIAN MARIE TESSIE DU, and EDMOND LOUIS DAFLOS, of Rue Drouot, Paris, France, chemist and merchant. *Improvements in the mode of bleaching fibrous and other substances.* Patent dated September 9, 1853. (No. 2081.)

Claims.—1. "The bleaching of fibrous and other substances by means of a current of oxygen in an allotropic form." 2. "The bleaching of fibrous and other substances by means of a liquid in which oxygen, in an allotropic form, is liberated."

AMORY, JONATHAN, of Boston, United States. *Improvements in furnaces.* Patent dated September 9, 1853. (No. 2082.)

Claim.—The combination with a furnace constructed with reverberatory chambers, having a series of ovens under them, of a pipe or pipes, one end of which communicates with the ash-pit under the main fire-chamber, and the other end with a cold air-chamber or the external atmosphere, while the pipe itself passes through the heated ovens or chambers formed under the boiler or boilers.

CHILDS, JAMES, of Gilston-road, Brompton, Middlesex, gentleman. *Improvements in the manufacture of materials to render them suitable as substitutes for millboard and such like uses.* Patent dated September 9, 1853. (No. 2083.)

This invention consists in combining very thin sheets of wood with sheets of paper or fibrous material, by means of cement. The wood in some instances is to be perforated with numerous holes, and the grain in the succeeding sheets is placed in different directions. The cemented sheets are, when necessary, submitted to considerable pressure.

GOUIN, ERNEST ALEXANDRE, of Avenue de Clichy, Batignolles, Paris, France. *Improvements in looms or weaving-machines, applicable to the weaving of cotton, silk, flax, hemp, wool, or any other fibrous substances, by means of which improvements the warp threads are unwound more regularly from the warp-roller, and the cloth or tissue taken up with more regularity, at the same time without straining the warp-thread; and by means of a peculiar motion in releasing the tension on the warp-thread, he is enabled to give an elastic or back motion to the warp, which permits of all inelastic fibrous substances to be woven upon the power-loom; and in case the weft-thread should break, the loom can continue in motion without the cloth-roller continuing to take up, or without detriment to the tissue.* Patent dated September 9, 1853. (No. 2085.)

This invention consists in a method of producing an equable resistance to the unwinding of the warp threads, which is done by an arrangement for gradually decreasing the weight or tension on the break pulley of the warp roller.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved manufacture of gas burner and gas regulator.* (A communication.) Patent dated September 9, 1853. (No. 2086.)

The improved gas burner, which the inventor terms the "self-regulating burner," is composed, by preference, of white metal, analogous in composition to Britannia-metal, and is formed of two tubular portions set one within the other. The outer one carries at its upper end the jet or tip through which the gas issues to be consumed, and the lower tubular portion forms a chamber for receiving the regulating apparatus.

DREW, ROBERT, of the firm of Drew, Nephew, and Co., of Bath, Somerset, stay-manufacturers, and JOHN BAYLISS, of Birmingham, Warwick, rifle-implement manu-

facturer. *Improvements in stay and other like fastenings.* Patent dated September 9, 1853. (No. 2087.)

In this invention the busk is provided with a series of studs, which enter slots formed in a steel strip when the edges of the stay are brought together, the steel strip overlaying the busk.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MEUSNIER, GRIGNON, of Paris, France, clock-manufacturer. *Improvements in carriage-clocks.* Application dated August 31, 1853. (No. 2018.)

This invention consists, firstly, in the application of a circular escapement to the front of a round or square movement, the front plate of which is cut through, so as to expose the escapement and a portion of the works to view; second, in the application of an alarm or chime, the key or arbor of the barrels of which is placed above the figure 6 of the circle of hours; and, thirdly, in constructing actuating wheel-work, to show the day of the week, month, and year, by means of the chime or alarm-barrel.

GRAZEBROOK, JOHN PHILLIPS, of Audnam, near Stourbridge, Worcester, glass manufacturer. *Improvements in the working-barrels of pumps, which improvements are also applicable to lining other metallic tubes.* Application dated August 31, 1853. (No. 2024.)

This invention consists in lining the iron tubes employed for the working-barrels of pumps, and other such tubes, with tubes of flint glass, in place of the ordinary coating of copper, the glass barrel having a flange formed on one end that fits into a corresponding socket in the end of the metal tube, and having also several horizontal grooves cut on its outer surface, to afford a hold for the cement with which it is attached to the metal.

MACINTOSH, JOHN, of Pall-mall, naval engineer. *Improvements in breakwaters.* Application dated September 1, 1853. (No. 2026.)

Mr. Macintosh's breakwater consists of two rigid surfaces or rafts, the upper one of which floats on the surface, the lower one to which it is firmly connected being submerged some distance below the surface, and inclined to the upper one. The breakwater is so moored that the waves enter between the surfaces where they are widest apart, and issue where they are nearest together.

AURIC, BARTHÉLEMY, of Grennelle, France. *The new application of sulphate of lime to the fabrication of the mosaics and incrustations, and for any new processes of coloration of certain varieties of this substance.* Application dated September 2, 1853. (No. 2030.)

The inventor divides blocks of common sulphate of lime into small pieces, and appropriates them to the purposes described in the title.

SIBLEY, JOHN, and THOMAS SIBLEY, of Ashton-under-Lyne, Lancaster, machine-makers. *Improvements in machinery or apparatus for cutting discs or circles out of plates or sheets of metal, or other substances.* Application dated September 2, 1853. (No. 2033.)

This invention consists of a combination of the circular shearing machine, with an apparatus by which the sheet or plate of the material to be cut into a circle is kept central, and at a distance from the circular shears equal to the radius of the discs or circles required; and which at the same time affords the means of readily entering the sheet or plate between the shears, and of adjusting it to the best cutting angle for all diameters.

ASHTON, WILLIAM, of Manchester, Lancaster, machinist, and WILLIAM BROTHERTON HARVEY, of Salford, braid manufacturer. *Certain improvements in machinery or apparatus for manufacturing braid.* Application dated September 2, 1853. (No. 2034.)

In ordinary braiding machines the leading "roses," or those which return the spindles forming the edge of the braid are made larger than the other "roses;" but this invention consists in forming all the "roses" of the same size, except the two leading "roses," which are made smaller than the rest, and with a smaller number of notches.

JEWISS, JOHN THOMAS, and DANIEL JEWISS, of Horsleydown, smiths. *An improvement in furnaces.* Application dated September 3, 1853. (No. 2035.)

This invention consists in constructing the bridge hollow with a slot at the top, and in conducting pipes, which open into the under part of the bridge, through the furnace, bending them down under the furnace door.

DOBELL, EBENEZER, of Hastings, Sussex, watch-maker. *Improvements in clocks or time-keepers, and parts connected therewith.* Application dated September 3, 1853, (No. 2036.)

This invention consists in arranging certain apparatus by means of which a series of time-keepers may be set to uniform time by the agency of an electric current.

DOYLE, JOHN, of Cambridge-street, Paddington, Middlesex. *The water-proofing of boots and shoes.* Application dated September 5, 1853. (No. 2041.)

This water-proofing consists in applying

a solution or paste to the inner coat of the upper leather, and another between the inner and outer soles. The invention also includes the fixing of the outer sole to the welt by means of an adhesive composition instead of stitches.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex. *Improvements in the manufacture of stays or corsets.* (A communication). Application dated September 5, 1853. (No. 2044.)

This invention relates to the manufacture of what are known as woven corsets, and consists in the employment of the Jacquards in the loom, one of which effects the shape or contour of the corset, and the other the formation of the double portions or slots for the introduction of the whalebones.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery in weaving terry fabrics.* (A communication.) Application dated September 5, 1853. (No. 2045.)

Instead of introducing and drawing out the wires by hand or by fingers, the inventor proposes to attach the wires to moveable arms, which are capable of being moved backwards and forwards and in and out of the shed.

CALLES, ANDRÉ, of Southwark-square, Surrey, mechanician. *Improvements in manufacturing typographic characters.* Application dated September 6, 1853. (No. 2049.)

This invention consists in manufacturing typographic types by means of machinery, which, by giving the necessary actions to the moulds and punches, replaces the several operations performed by workmen.

KERFOOT, JOHN, of Lower Darwen, Lancaster. *Improvements in machinery for spinning cotton or other fibrous substances.* Application dated September 6, 1853. (No. 2050.)

These improvements have reference to the self-acting mule, and consist mainly in regulating the speed of the spindles, so as not to break or injure the yarn in winding it upon them as the carriage goes in, by the application of two friction-pullies, together with an improved catch-box.

FLETCHER, JOHN GASKIN, of Accrington, Lancaster, warehouseman, and WILLIAM PEEL, of the same place, weaver. *Improvements in looms for weaving.* Application dated September, 7, 1853. (No. 2057.)

This invention consists in a method of quickly arresting the motion of the stay without a sudden shock. In this arrangement, when the shuttle by any chance stops in the shed, swells in the shuttle-boxes are pressed inwards, and bring the lower arm of a bent lever attached to the stop-rod, on a level with a vertical catch, on a transverse rod which runs the entire length of the front of the loom, being carried by the end-standards or framing. This rod carries also two other catches or arms, which are placed opposite two strong blade-springs, one on each of the sword-arms. The bent lever on the stop-rod strikes against the vertical arm of the transverse rod, and thereby raises the two other arms, bringing them to the same level with the blade-springs, which strike against them.

ASHTON, GEORGE EDWARD, of Middlesex, gentleman. *Converting certain refuse materials into yarn for the manufacture of woven and other fabrics.* Application dated September 7, 1853. (No. 2061.)

This invention consists in cutting old wearing-apparel and other such materials into pieces, unravelling these by hand or by machinery, and in then carding or combing and spinning into yarn the materials thus obtained.

PAPE, SIMPSON GOY, of Gloucester-crescent, Camden-town, Middlesex. *Brace-ends, being a new suspender for trousers, breeches, and drawers.* Application dated September 8, 1853. (No. 2063.)

This invention consists in attaching brace buttons to braces, and forming corresponding holes in the trousers and drawers.

BRUNTON, JOHN DICKINSON, of Truro, Cornwall, engineer. *An improved wind-guard or chimney-top.* Application dated September 8, 1853. (No. 2066.)

Claim.—A peculiar construction of wind-guards or chimney-tops in the partitioned or channelled conical caps.

PETRIE, JOHN, Jun., of Rochdale, Lancaster, ironmonger. *Improvements in cans or vessels used for applying oil or other lubricating materials to machinery.* Application dated September 8, 1853. (No. 2067.)

This invention consists in forming cans or other lubricating vessels, either wholly or partly of malleable cast iron.

BURROWS, JAMES, of the Haigh Foundry, near Wigan, Lancaster, engineer. *Certain improvements in the formation or construction of rolled metallic plates.* Application dated September 8, 1853. (No. 2069.)

This invention consists in forming rolled plates with raised parallel ribs, "when such plates are required to possess the maximum of strength and the minimum of weight."

GRANT, PHILIP, of Manchester, Lancaster, letter-press printer, and JOHN DOHERTY, of the same place. *Improvements in the mode or method of cutting and finishing brass rule and wood reglet used in the art or process of letter-press printing, and other similar purposes; and in the machinery or apparatus employed therein.* Application dated September 9, 1853. (No. 2073.)

This invention consists in passing the sheet brass from a cylinder between studs,

so that it shall come in contact with cutters which shape the edges of it as it passes on to another cylinder.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *An improved apparatus for facilitating the acquirement of the art of reading.* (A communication.) Application dated September 9, 1853. (No. 2074.)

This invention consists in an arrangement in which letters, syllables, &c., are printed on bands which are passed round rollers by means of buttons fixed on their outer ends; and as the bands are wound up, the various letters, syllables, &c., are brought behind suitable openings in the box.

MARTIN, JAMES, of Faversham, Kent, watch-maker. *Improvements in locks.* Application dated September 9, 1853. (No. 2077.)

On the back of the key-hole plate the inventor fixes a pair of doors on hinges, which, on the insertion of the key, are opened so as to admit it into the working parts of the lock. The first motion of the key, or the first turn of any instrument inserted for the purpose of picking the lock, causes a lever and wedge-bolt first to free a wedge which held the doors open, and then to keep them firmly closed. No key or instrument, except that bearing the exact wards of the proper key, could then turn the bolt of the lock, nor could any but the proper key free itself by acting upon the locking-wedge, which would then release the doors, and allow the key to be withdrawn.

DOYLE, JOHN, of Cambridge-terrace, Paddington, Middlesex. *The better ventilation of field-tents and marquees.* Application dated September 9, 1853. (No. 2078.)

This invention consists in attaching to orifices in the walls of tents and marquees funnels, which are carried upwards within the same, and admit a current of fresh air to communicate with either the door or with ventilating apparatus.

WOODHEAD, HENRY, of Kingston-upon-Hull, cotton-spinner. *Improvements in spinning machinery.* Application dated September 9, 1853. (No. 2084.)

This invention consists in combining two sets of drawing rollers in such manner that the fibres having been drawn out by one set, pass through suitable guides or bell-mouth tubes to the second, and thence to the flyers of the spindles.

PROVISIONAL PROTECTIONS.

Dated October 17, 1853.

2389. William Roy, senior, of Cross-Arthurlie, Renfrew, calico-printer. Improvements in the preparation or thickening of colouring matters for printing.

Dated February 13, 1854.

352. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improved mode of protecting iron from oxidation. A communication.

Dated February 22, 1854.

428. Edward Massey, of Tysoe-street, Clerkenwell, Middlesex. Improvements in ships' logs, known as "Massey's Patent Ships' Logs."

Dated February 28, 1854.

477. Leontide Aglaée Pallegoix, spinster, and Alexandre Louis Bellange, gentleman, both of Paris, France. Improvements in treating wheat and other grain.

479. Frederick Samson Thomas, of Cornhill, London, gentleman. A new rifle-carriage.

481. Auguste Edouard Loradoux Bellford, of Castle-street, London. Improvements in the means of admitting the steam or other motive power agent to and exhausting it from the cylinders of oscillating engines. A communication.

485. André Louis Mallet, of Rue de la Pepinière, Paris. Improvements in apparatus to destroy the effects of shocks.

487. James Medwin, of the Blackfriars-road, Surrey, engineer. An improvement in water-gauges for steam boilers.

489. John Thomas Way, of Holles-street, Middlesex, and John Manwaring Paine, of Farnham, Surrey. An improvement in the manufacture of gas, and also of a charred product.

491. John Soden Holbeche, of Sutton Coldfield, Warwick, builder. Improvements in the construction of invalid bedsteads, which said improvements are also applicable for couches, chairs, and reclining seats or beds for invalid carriages.

Dated March 1, 1854.

493. Henry Gilbert, of Suffolk-street, Pall-mall East, Middlesex, dentist and surgeon. Improvements in connecting and supporting artificial teeth.

495. Wilhelm Ehrhardt, of Birmingham, Warwick, machinist. Improvements in the construction of ordnance and fire-arms, and in loading the same.

497. William Joseph Curtis, of Birchin-lane, London, civil engineer. An improved levigating machine.

501. John Sibley and Thomas Sibley, both of Ashton-under-Lyne, Lancaster, machine-makers. Improvements in machinery or apparatus for cutting discs or circles out of plates or sheets of metal or other substances.

503. Michel Napoleon Illakowicz, artist, of Maddox-street, London. Improvements in picture-frames.

505. John Simon Holland, of Woolwich, Kent, engineer. Improvements in locks.

Dated March 2, 1854.

507. John Parry the younger, of Liverpool, Lancaster. Improvements in mills or machinery for grinding or cutting bones, wood, or other like substances. A communication.

508. Richard Vinkeles Houssart, of Dunstan-street, Kingsland-road, Middlesex, and Robert Houston, of Skinner-street, Snow-hill. Improvements in vessels to contain fluids.

509. Hugh Ellis and John Ellis, both of Salford, Lancaster, engineers and millwrights. Improvements in machinery or apparatus for stretching and finishing woven fabrics.

510. Andrew Barclay, of Kilmarnock, Ayr, engineer. Improvements in lubricating shafts and revolving metallic surfaces.

511. Andrew Barclay, of Kilmarnock, Ayr, en-

gineer. Improvements in arranging and working mining engines and machinery.

512. John Currie, of Glasgow, Lanark, miller. Improvements in the treatment and grinding of grain, and the products thereof.

513. Thomas Dawson, of King's Arms-yard, London, engineer. Improvements in umbrellas and parasols.

514. John Tann, of Minerva-terrace, Hackney-road, Middlesex, patent lock manufacturer. Improvements in the construction of locks.

Dated March 3, 1854.

516. Timothy Yates and Rufus Yates, of Bury, Lancaster, overloookers. Improvements in looms.

518. Lorenzo Tindall, of Scarborough, York, ironmonger. Improvements in churns.

520. George Spill, of Old Farm House, Steppney. Improvements in the application of waterproof hatbands to the manufacture of hats.

521. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improved machinery for measuring and folding cloth and other fabrics, or manufactured materials. A communication.

522. Caleb Bloomer, of West Bromwich, Stafford, manufacturer. Improvements in spikes and bolts.

523. Joseph Bour, of the Mauritius, but now at Cullum-street, London. Improvements in evaporating saccharine liquids.

524. William Vaughan, of Stockport, Chester, gentleman, and John Scattergood, of Heaton Norris, Lancaster, machinist. Certain improvements in machinery, apparatus, or implements for weaving.

Dated March 4, 1854.

526. Charles Nightingale, of Wardour-street, Soho, Middlesex, bedding-manufacturer. Improvements in the mode of curling horsehair and other materials.

528. Richard Madeley, of Birmingham, Warwick, merchant and manufacturer. An improvement or improvements in the joints and framing of metallic and other bedsteads, chairs, sofas, couches, and such other articles as are or may be used for sitting, lying, and reclining upon.

530. Herman Dirs Mertens, of Margate, Kent, gentleman. Improvements in working steam-engine valves. A communication.

532. John Knox Stuart, of Glasgow, Lanark, surgeon. Improvements in hats and other coverings for the head.

Dated March 6, 1854.

534. John Warhurst, of Hollingworth, Chester, cotton-dealer. Improvements in steam boilers.

538. Thierry Hubert de Nivelles, of Foley-place, Middlesex, gentleman. Certain apparatus for separating metallic from earthy and other substances, and for classifying metallic substances according to their specific gravities.

540. Pierre Amable de St. Simon Sicard, of Paris, chemist. Improvements in purifying sea and other water.

542. Benjamin Brokenshar, of St. Austell, Cornwall, mining engineer. An improved amalgamator.

Dated March 7, 1854.

544. William Clay, of Liverpool, Lancaster, iron-master. An improved mode of manufacturing axles, shafting, and other like solid articles which present a round figure in cross section.

546. George Chant, of Stoke-sub-Hamdon, Somerset, glove-maker. A fan-parasol, or sun-shade.

Dated March 8, 1854.

548. Henry Bernoulli Barlow, of Manchester. Improvements in waterproofing and finishing textile fabrics and yarns. A communication.

550. George Beardsley, of Coal Pit-lane, Nottingham, lace-maker. Improvements in round or circular machinery for the manufacture of textile and looped fabrics.

552. John Dickinson Brunton, of Truro, Cornwall, engineer. Improvements in wind-guards or chimney-tops, for promoting ventilation in fire-place flues.

556. Guiseppe Devincenzi, of Grosvenor-street, Middlesex, gentleman. An improvement in producing ornamented and figured surfaces, and surfaces for printing from.

558. William Warne, of Lower Blowing House, St. Austell, Cornwall. Improvements in tubular steam boilers or generators.

560. John Blair, of Irvine, Ayr, gentleman. Certain improvements in beds or couches, and other articles of furniture.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

571. Sanders Trotman, of Portman-square, Middlesex, hydraulic engineer. An improved alarum night-clock or time-indicator. March 9.

585. George Appolt, of Sulsbach, Prussia, and Charles Appolt, of Metz, France. Improvements in the manufacture of coke. March 10.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March 17th, 1854.*)

2367. William Ridgway. Improvements in the construction of ovens and kilns.

(*From the "London Gazette," March 21st, 1854.*)

2431. Christopher Cross and James Crosby. Improvements in machinery or apparatus for weaving.

2434. Charles Nicolas Michel and Augustin Lecomte. Certain improvements in windows.

2441. Harry Bentley. Improvements in steam boilers, and in the method of setting or fixing the same.

2444. Thomas Connell. An improved safety apparatus and method or means of signalling, to be used on railways in cases of danger or emergency.

2448. Henry Kraut. Improvements in apparatus for regulating the temperature of stoves and furnaces, and of water, air, or other fluids contained in vessels or chambers, the strength of spirituous liquors, and of chemical mixtures, and the hygrometric state of the air in buildings, rooms, &c.

2459. John Drumgoole Brady. An appendage to knapsacks.

2479. Romain Joly. Improvements in dyeing.

2481. James Thomas George Vizetelly. Improvements in producing plates for printing purposes, by which the manipulatory process of engraving is superseded. Partly a communication.

2482. Amédée François Rémond. Improvements in the manufacture of certain kinds of metallic vessels.

2511. Felix Paulin Rovére. Improvements in joints for tubular drains.

2569. John Smith. Improvements in mill-stones for grinding corn, seeds, or minerals.

2571. Samuel Harrison. Improvements in and applicable to steam engines.

2573. Charles Carr and William Kyle Horsley. Improvements in steam machinery and pumps for lifting water from mines and other places.

2576. James Barlow and Thomas Settle. Certain improvements in power-looms for weaving.

2611. Henry Walker. Improvements in means

of communication from one part of a railway train to another.

2614. William Steel. Improvements in machinery or apparatus for mashing malt.

2623. François Amand Delande. A new metallic composition.

2664. Solomon Abraham and Samuel Victor Abraham. Communicating information or directions to persons in charge of railway-trains.

2681. Jean Baptiste Clavières. An improved mode of giving publicity.

2688. James Harris. Improvements in apparatus for heating water and other fluids.

2769. Robert Hawkins Nicholls. Improvements in hoeing, and otherwise cultivating land.

2778. Auguste Edouard Loradoux Bellford. Improvements in fire-arms. A communication.

2836. John Henry Johnson. Improvements in printing oil-cloths and other fabrics. A communication from Benjamin Underwood, of New York.

2980. James Gibbons. Improvements in locks and latches.

196. Charles Reeves, junior, and William Wells. An improvement or improvements in casting metals.

219. Peter Armand Lecomte de Fontainemoreau. Improved means of preventing accidents on railways. A communication.

220. Peter Armand Lecomte de Fontainemoreau. Certain arrangements for preventing accidents on railways. A communication.

232. Edward William Kemble Turner. Treating gold and other ores.

312. Peter Armand Lecomte de Fontainemoreau. Improvements in fire-arms. A communication

320. David Brown and John Brown. An improvement or improvements in the construction and manufacture of axles for railway and other carriages.

343. Thomas Edwards. A new or improved fastening for articles of dress.

365. Benjamin Hornbuckle Hine, Anthony John Mundella, and William Onion. Improvements in machinery for the manufacture of textile and looped fabrics.

368. John Wren. An improved construction of folding chair bedstead.

373. John Greenwood and Robert Smith. Certain improvements in sizeing, stiffening, and finishing textile materials or fabrics.

402. James Beall. Improvements in apparatus for suspending looking-glasses in frames.

428. Edward Massey. Improvements in ships' logs, known as "Massey's Patent Ships' Logs."

429. Samuel Colt. Improved machinery for rifling fire-arms. Partly a communication.

438. William Hunt. Improvements applicable to the utilising of ammonia given off in certain manufacturing processes.

473. Charles de Bussy. Improvements in machinery or apparatus for the amalgamation of gold ores.

485. André Louis Mallet. Improvements in apparatus to destroy the effects of shocks.

487. James Medwin. An improvement in water-gauges for steam-boilers.

494. Jean Toussaint Cortin. Soleing shoes and boots with leather combined with gutta percha and wood, sewed with metallic wire.

496. Charles Hargrove. An improvement or improvements in steam-boiler and other furnaces.

502. William and Joseph Clibran. Certain improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.

505. John Simon Holland. Improvements in locks.

506. Thomas Metcalfe. Improvements in the manufacture of portable and folding bedsteads, chairs, seats, tables, and cots.

507. John Parry the younger. Improvements in mills or machinery for grinding or cutting bones, wood, or other like substances. A communication.

526. Charles Nightingale. Improvements in the mode of curling horse-hair and other materials.

530. Herman Dirs Mertens. Improvements in working steam-engine valves. A communication.

534. John Warhurst. Improvements in steam boilers.

538. Thierry Hubert de Nivelles. Certain apparatus for separating metallic from earthy and other substances, and for classifying metallic substances according to their specific gravities.

585. George Appolt and Charles Appolt. Improvements in the manufacture of coke.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed March 17, 1854.

2168. Baron Henry de Bode.

Sealed March 18, 1854.

2174. Thomas Restell.
2194. Thomas West Walker.
2228. Michel Ovide Bernard Lesage.
2288. Thomas William Kennard.
2332. William Muir Campbell.
2505. Andrew Maclure.
2651. James Wills Wayte.
2958. Paul Wagenmann.
3008. John Macintosh.

1854.

57. Elmer Townsend.
101. George Fergusson Wilson.
108. Edward Highton.
134. Nehemiah Hunt.
147. Henry Watson.
178. John Ridgway.

Sealed March 20, 1854.

2181. Ferdinand Potts.
2184. Henry Needham.

Sealed March 22, 1854.

2190. James Baldwin.
2191. Frederick Crace Calvert.
2235. Peter Armand Lecomte de Fontainemoreau.
2293. James Bullough, John Walmsley, and David Whittaker.
2353. William Muir Campbell.
2411. Robert Shaw.
2521. John Crowley.
2777. Louis Alexandre Michel.

1854.

25. William Rigby.
35. John Davie Morries Stirling.

71. Henry Beaumont Leeson.

165. Henry Seebohm.

205. Thomas Thurlby.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

G. W. T.—Mr. Mears' is a small work, called "The Decimal Calculator, or Figures Simplified," price 6d. Mr. Rathbone's "Examination of the Report and Evidence of the Committee of the House of Commons on Decimal Coinage," price 1s., is also spoken very highly of by the press.

G. M., Edinburgh.—The publication of Tomlinson's "Cyclopædia of Useful Arts" is not discontinued.

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'o. 1599.] SATURDAY, APRIL 1, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

WRIGHT'S PATENT QUARTZ-CRUSHER AND SEPARATOR.

Fig. 1.

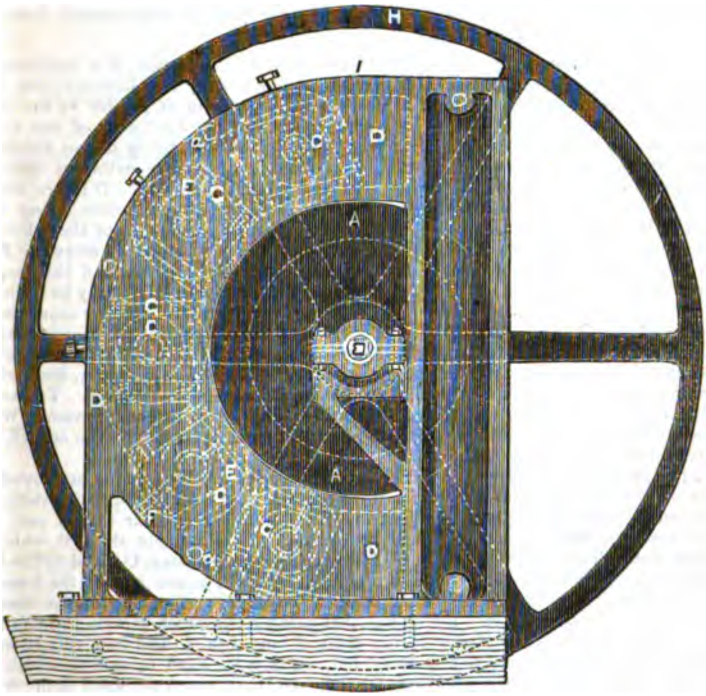
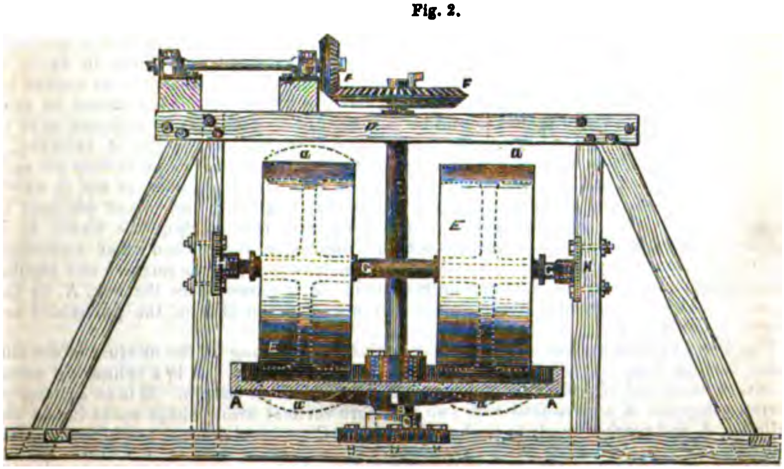


Fig. 2.



WRIGHT'S PATENT QUARTZ-CRUSHER AND SEPARATOR.

(Patent dated July 2, 1853.)

Mr. Wright, of Chalford, has added another to the many machines already invented for the reduction of metalliferous quartz, and the separation of the metal from it. In his invention three different apparatuses are employed: the first for reducing the heavy quartz or dense and hard earths; the second for pulverizing the same; and the third, comprising mixing and washing arrangements for separating the gold or other metal from the pulverized quartz or earths containing it.

Fig. 1 of the accompanying engravings represents a side elevation of a machine for crushing or breaking down quartz rock or earths, compounds, or metalliferous ores containing gold or other metal, previous to being reduced to a state of powder by the other arrangements of machinery hereafter explained. A A is a central cylinder of iron firmly fixed upon the shaft, B. This cylinder forms the prime mover, being driven either by means of a steam engine or by water. C C are a number of smaller cylinders arranged partly round the cylinder, A, and driven by frictional contact therewith. D D are cheeks or framework for supporting and combining the several parts of the machine, being connected and held together by transverse iron tie-rods, *a a*. The spindles of the cylinders, C C, are supported and turn in blocks, E E, capable of being adjusted by screws, F F, in order to regulate the distance or space between the main cylinder, A, and the smaller cylinders, C C, as circumstances may require; or the cylinders, C C, may be adjusted and held up against the main cylinder, A, by means of weighted levers or any other convenient contrivance. The adjusting blocks, E E, rest on and are supported by iron bearers, G G, which are connected to, or form part of the framework, D D. H is a fly-wheel on the main shaft, B, for regulating the motion of the machine. I is a hopper, from which the machine is fed or supplied with the ore or other substance to be crushed. The action of the machine will be readily understood from this description of its construction. When it is at work, the material, as it is crushed, follows the course indicated by the arrows, and is delivered from the machine at the point *b*.

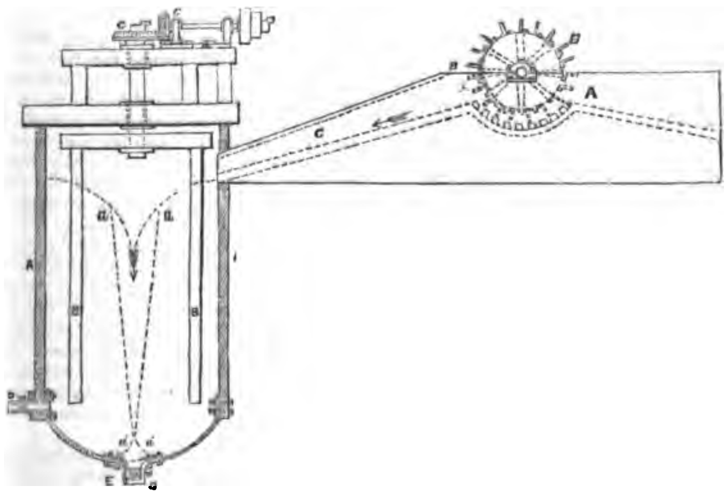
Fig. 2 represents a side elevation, partly in section, of a machine to be employed for reducing the ore or other substance to an impalpable powder, after having been subjected to the action of the crushing-machine just described. A is a circular disc of cast iron (shown in section) flanged at the edge, and firmly fixed to the upright shaft, B, which is also of cast iron. The lower end of this shaft turns in a cast-iron step, C, fixed to the base of the framing, and the upper end works in bearings, D, in the upper part of the framing. E E are two cast-iron cylinders or rollers running on edge, and resting on the disc, A, and revolving by contact with it. F F is bevelled gearing, by which motion is communicated from any suitable prime mover to the shaft, B, and disc, A, and from this latter to the cylinders or rollers, E E, as before mentioned. G G is the shaft or axle on which the rollers, E E, revolve, and H H the bearings for the shaft, G G, which are fixed to the framing of the machine. The rollers, E E, instead of being formed with flat surfaces working against the disc, A, may be constructed with convex surfaces working into a corresponding concavity in the disc, as shown at *a a*. The ore or substance to be reduced in this machine, having been previously crushed in the machine before described, and shown in fig. 1, is introduced into the machine, with a sufficient quantity of water to cause it to be worked by the action of the rollers, E E, into a stiff pasty mass, in which state it is removed for subsequent treatment. The machine should be furnished with gatherers or scrapers, so as to cause the material to be kept constantly under the rollers, E E, as the disc, A, revolves.

Fig. 3 is a side elevation of a machine for the purpose of mixing the pulverized ore as it comes from the machine, fig. 2. A is a three-sided box or trough, open at top, in which is fitted a float-wheel, B, by which the pulverized ore is agitated and mixed previous to its passing into the washing-machine. In working with this machine the wheel, B, is put in motion in the direction of the arrow by any convenient means, and water is admitted into the box, A, by a pipe and cock in sufficient quantity to bring the mixture to a regular and suitable consistency for subsequent operations as it passes from the box, A, by the spout, C. The quantity of water required will depend upon that of the pulverized ore placed in the box, A.

Fig. 4 is a vertical section of a washing-machine for operating on the mixture of ore and water coming from the mixing-machine just before described. A is a cylindrical vessel or casing composed of wood or metal, and having a spherical bottom. B is an agitator or stirrer, composed of a crosshead with two or more vertical arms, which works inside the cylinder, A, and reaches nearly to the bottom of it. C C are bevel-wheels, by which the agita-

tor, B, is set in motion, and means should be provided for enabling the velocity of the motion to be increased or diminished, as may be required. In working with this machine the cylinder, A, is filled with water nearly to the level of the trough leading from the mixing-machine, and the agitator, B, is then set in rapid motion by means of the gearing, C C, when the water will take a circular course, somewhat as shown by the dotted lines, *a a*; the mixture of ore and water from the mixing-machine is then admitted to the cylinder, when the semi-fluid mass will also take the same circular course as the water, and the lighter particles will be thrown

Fig. 4. Fig. 3.



by centrifugal force from the centre towards the sides of the cylinder, while the heavier particles will arrange themselves, according to their specific gravity, nearer to the centre, the heaviest particles of gold and other metals being found at the centre of the cylinder, where they will fall by gravitation, forming a conical heap at the bottom, as shown at $a^1 a^1$, and the lighter particles flowing out through the pipe, D, the cock of which is left open during the operation. When the washing is completed, the gold and metal collected at the centre of the cylinder can be withdrawn through the pipe, E, by opening the cock attached to it.

PROPORTIONS OF LOCOMOTIVE BOILERS.

BY ZERAH COLBURN.

I propose to discuss, in this paper, some of the proportions of the greatest influence in the production of steam in locomotive boilers. I shall endeavour to do so in the plainest manner, so that my deductions, if they should be founded on a correct conception, may be available to the operative as well as the theorist.

The objects sought in the construction of any boiler, of a given size and weight, are the generation and economical absorption of the greatest amount of heat. The first of these operations is made in the furnace; the second in both the furnace and tubes.

As the ordinary *form* of locomotive boiler is found to be of the most efficiency in these operations, I shall discuss, as I have already said, only the *proportions* of the locomotive boiler, and shall suggest no essentially different form or mode of construction.

The requisites for a boiler-furnace are capacity for fuel, admission of air, water contact, escape of gases, and provision, of course, for firing. The first involves the amount and relation of length, width, and depth of furnace; the second, the gross area and air-opening of grate; the third, the "water spaces" around furnace; the fourth, the openings into tubes, and the last is had by the door.

The capacity and relative dimensions of furnace, grate area, air-opening, and tube-opening, are the principal fire-box details

which are influential in the generation of heat. All of these dimensions are deducible more from experiment than from theoretical inquiry. In discussing their extent and mutual relation, however, there are considerations which, if allowed for, will determine many of the general principles upon which they are based.

The capacity of furnace must be such as to contain, without choking the ends of the tubes, sufficient fuel for the necessary rate of combustion, and without the necessity of constant firing. The grate air-opening must admit sufficient air for the given rate of combustion, and as this air is expanded to six or seven-fold volume before leaving the furnace, the exit openings must be of ample dimensions.

The capacity of furnace is governed materially by the amount of carbon, proportionate to the whole amount, in bulk, of fuel burnt. Coke is nearly all carbon; wood contains but a small proportion, say from one-fourth to one-third. As carbon is the true heating element, the capacity of furnaces should be, other things being equal, inversely as the quantity of carbon in a given bulk of fuel.

Again, the admission of air is distributed over nearly the entire bottom of the furnace. The escape of air is made from but one end of the furnace.

The transition from these general principles is easy. The capacity of the furnace has been increased, in modern locomotives, more by an increase of length than of either of its other dimensions. This was done because the space between the driving-wheels was limited, and that a portion of this space was required for the framing and springs of the engine. For a gauge of 4 feet 8½ inches, the distance between the driving-wheels, transversely across the engine, is 4 feet 5¼ inches. Many engines have been built, where the width of frame and springs would give a grate of but 35 inches width, while in other cases, by a different arrangement of framing, this width has been made 44 inches.

Now, I wish to maintain the general principle, that *width* of furnace is more influential in producing rapid combustion than *length*. The reasons may be briefly stated as these:—The air passes through the fuel for the distance in which the latter lies in the furnace. A number of diagonal lines might be drawn from the centre of tube openings to successive points in the length of the grate, which will essentially represent the general distance traversed. From the fact, however, that the surface of the fuel generally inclines towards the tubes, *increase* of distance is greater with each successive horizontal approach to the back side of the furnace. Often, too, the grate inclines *from* the fire, by which the difference of distance is rendered still greater, according as the entrance of air is made toward the back side of the furnace.

Now, in proportion to the distance traversed is the superficial resistance of the fuel to the passage of air increased. It must be, at least, in this proportion, while the impact or "momentum" of the air would be of some more advantage with a thin fire than with a deep one. Again, were the distance traversed among the fuel, by the air, the same, the effect of the draft would be exhibited more strongly upon those contents of the furnace *nearest* the source of the action of the draft. And the ascent of air, answering to the demands of the draft at the tube mouths, would *supplant* the air, so to speak, that might otherwise enter the tubes from the rear of the furnace.

From these combined circumstances the intensity of the draft is inversely to the distance of the place of entrance from the place of escape of the air, but not in the same ratio. It may not be an unfair estimate to consider the intensity of the draft diminished three-fourths when the distance traversed by the air is doubled by horizontal removal of the place of air admission from the tube sheet.

It is in consequence of the greater intensity of the draft at the forward end of the grate that, to prevent the insulation of the lower part of the tube sheet by unheated air, the "dead plate" is used to exclude the air at that point. The "dead plate" is merely a closed bottom of the furnace, or "blank grate," and is now much used to promote economy of fuel in wood-burning engines, while it is claimed as an essential feature of Mr. Milholland's coal-burning boiler.

The "dead plate," however, robs the grate, as the space above this plate receives no direct supply of air; serving for no other purpose than to hold an amount of fuel which would be just as well held by an increase of the depth of the furnace. Now, as that portion of the furnace above the mouths of the bottom tubes cannot be filled with fuel without liability of "choking" the mouths of the tubes, whereby the production of carbonic oxide is caused, much of the heat is wasted, and the steam pressure falls below the working point, it would appear that there could be no loss of room available for fuel, or of the useful capacity of the furnace, by projecting the tube sheet inwards and towards the door. It would add a little, say ten dollars' worth of labour, to the expense of making the boiler, but it would, doubtless, save that trifling sum in a short time by more economical consumption of

fuel. The supply of air would be increased by permitting the use of the entire area of grate, while the passage of unheated air would be *from* and not *upon* the front sheet; and, what is of nearly equal importance, the contents of the back portion of the furnace would be brought nearer the action of the draft. With a projecting tube sheet there would be less liability of covering the mouths of the tubes.

There is another important object to be secured by widening the furnace to the greatest limits allowed by a common gauge. With a boiler of the largest size which can be got between the wheels, and such as are becoming general standards for heavy express engines, it becomes necessary to increase the width of fire-box above the frame, to obtain room for a sufficient number of tubes. The water spaces, for the same reason, are made as thin as possible, and the ascent of steam is therefore retarded, the tendency being to diminish rather than increase the width of water space towards the top of the furnace. Under the combined contraction of the water spaces, and their curved, instead of straight, upward direction, they do not prove as serviceable as they should in the production of steam, and they do not so fully prevent over-heating. The width of the water spaces, next to that of the furnace, is among the most important dimensions of the boiler.

In proportion as width is substituted for length of furnace, the ash-pan may be diminished in depth, and room obtained for some increase of depth of furnace. The damper also becomes more sensitive to the admission of air, and can be regulated with more economy in its operation on the draft.

The relation of length to width in some of our modern wood-burning locomotive furnaces is as $1\frac{1}{2}$ to 1. With many of Stephenson's earlier engines, the proportion was as about one-half to 1.

Keeping in view the requisite of mixing the greatest quantity of carbon and oxygen in a given time, and with a given weight and size of boiler, we must remember that while the former element is supplied by *hand*, the latter is only supplied by means which impose, at the best, a sensible load upon the working of the engine. Inasmuch, however, as a natural admission and escape of air is maintained is this resistance reduced. If we find that the resistance to the admission of air is reduced by substituting width for length of grate, by so much we may know will be reduced the power of draft necessary to overcome this resistance, or, with a given draft, by so much will combustion, otherwise evaporation, or otherwise *power*, be increased.—*Journal of the Franklin Institute.*

(*To be continued.*)

MARTIN'S JACQUARD MACHINE. —RUTHVEN'S PROPELLER.

At the meeting of the Institution of Civil Engineers, on March 21st, the first paper read was a "Description of Martin's Improved Jacquard Machine," by Mr. Edward Laforest.

After stating the very general application of Jacquard machines to all ornamental weaving, the paper described the old machine, and the manner in which the patterns were produced by means of bands of punched cards acting on needles with loops, or eyes, which regulated the figure. It showed also the great wear and tear to which these cards were subjected; indeed, so much, that for the carpet trade they were often required to be made of sheet iron.

In Martin's new Jacquard machine, the object had been to substitute for the heavy cards, a sheet of prepared paper punched with given apertures, like the cards of the old machines, but instead of being a series of pieces $2\frac{1}{4}$ inches wide, laced together, the punched paper formed a continuous band, only three-quarters of an inch wide; thus so diminishing the bulk, that the weight of the new band, as compared with that of the old cards, was in the proportion of 1 to 11.

The method by which this desirable result had been attained was then explained to be chiefly by an arrangement which permitted the four hundred spiral springs on the needles, used in the old machine, to be dispensed with; when, as a consequence, the force and wear and tear due to their resistance would be done away with, and fine and light wires could be made to do the work of strong and heavy ones.

In order to render this clear, one of Martin's machines, with a part of an old machine, and bands of equal numbers of cards, under each system, were exhibited.

The next point demonstrated was, that like the bulk and weight, the cost of the cards, under the new system, would be greatly reduced.

It was shown that by an improved system of punching machinery, the bands could be cut from a design, previously perforated, at the rate of 3,000 cards per hour, and any number of duplicates could be produced with equal celerity; it was also stated that, by these means, when a pattern became fashionable, any number of looms might be set to work on it in about as many days as it had previously required weeks under the old system. The price of the old cards was 6s. 9d. to 8s. 6d., and upwards, per 100 for new sets, and 5s. 6d. for recuts; whereas the new paper bands would cost 1s. per 100, and 6d. per 100 for recuts. The comparison of cost of 3,000 cards (an average band) would, therefore, stand thus:

	Cost.	Weight.	Length.
	£ s. d.		
3,000 cards at 6s. 9d. per 100 . .	10 2 6	90 lbs.	600 ft.
3,000 new bands at 1s. per 100 . .	1 10 0	8¾ lbs.	63 ft. 9 in.

In reference to durability, it was stated that a band had been in constant work for two years, although used as a heavy waistcoat piece.

The second paper read was "An Account of the Deep Sea Fishing Steamer *Enterprise*, with Ruthven's Propeller," by Mr. D. K. Clark, Assoc. Inst. C.E.

The vessel was described as having been built for the "Deep Sea Fishing Association of Scotland," under the direction of the author, the consulting engineer to the company, who had recommended the trial of Ruthven's propeller for fishing uses, in preference to the paddle or the screw, chiefly on account of there being nothing likely to interfere with the fishing nets; and also because the success of the previous trials of this means of propulsion on board of boats 30 feet and 40 feet in length, when a speed of 7 miles per hour was attained, appeared to warrant its being tried on a larger scale.

The chief dimensions of the *Enterprise* were stated to be: — Length on deck, 95 feet; length at the water line, 87 feet; breadth of beam, 16 feet; depth, 8 feet; draught to load-water line, 4 feet; burthen, 100 tons. The propelling power was derived from two pairs of horizontal oscillating cylinders, 12 inches diameter, and 24 inches stroke (with corresponding air-pumps and condenser), working on a vertical crank-shaft. There was one cylindrical boiler, 6 feet in diameter, and 5 feet long, with two through fire-tubes, 22 inches diameter, and 105 return flue tubes, 5 feet long, and 2 inches internal diameter. The propeller consisted of a fan-wheel, or centrifugal pump, 7 feet in diameter, with curved blades keyed on the lower end of the crank-shaft; it revolved horizontally in a water-tight wheel-chamber, into which the water from the sea flowed along a covered passage, or water chamber, through crescent-shaped openings in the bottom of the hull; and the water was expelled laterally from the fan-wheel in two continuous streams by curved pipes with nozzles 10 inches diameter, through the sides of the hull. The nozzles worked in collars affixed to the sides, so that they could be pointed astern, or ahead, as required, for forward or backward motion; or vertically downwards when the vessel was to remain at rest. These changes were made rapidly and easily, as the nozzles alone were operated upon, whilst the engine continued to work at full speed. By setting the nozzles in opposite directions, one pointing ahead and the other astern, the vessel could be turned on the spot, swinging on her beam, without the aid of the rudder; the vessel could thus be steered by the nozzles, in case of the rudder being lost or disabled. In fact, the manœuvring of the vessel was entirely in the hands of the persons on deck. The fan-wheel and water passages were entirely of wrought iron, and all the parts were formed to avoid sudden enlargements, or quick turnings, and the consequent absorption of power in the passages by friction and eddies.

The motion of the vessel was very smooth, and all tremulousness was avoided by the uniform and continuous action of the propelling streams of water.

In a trial trip with the *Enterprise* on the 16th Jan., 1854, from Granton to Kirkaldy and back, a distance of 10½ miles each way, the average speeds obtained were, 9·69 miles per hour going, and 9 miles per hour returning, giving a total average of 9·35 miles per hour, running against the tide for the greater part of the trip, and with a breeze ahead on the return trip. The engine made 50 revolutions per minute, and was calculated to have exerted 40 indicated h. p., from the observed average pressure of 20 lbs. in the boiler, with the valve gear cutting off at one-sixth of the stroke. The consumption of fuel averaged 5 lbs. of coal per estimated horse power per hour. On another occasion, in a trial of her speed with one of the Granton and Burntisland ferry boats, the *Enterprise* kept pace with the ferry-boat, at the regular speed of 12 miles per hour, the engine making 70 revolutions per minute.

In the estimate of the efficiency of this method of propulsion, with respect to the power applied at the fan-wheel shaft, three sources of loss were admitted: first, the friction of the water in passing through the fan-wheel and passages; second, the excess of the effluent velocity of the water at the nozzles, above the speed of the vessel; third, the elevation of the water-jet above the sea level. The first had been found, by careful experiment, with a small model, to amount to 16 per cent. of the power applied to the wheel-shaft; the second was estimated, from the known data, at 12 per cent.; and the third, at 8 per cent.—making a total loss of 36 per cent., and leaving a useful balance of 64 per cent. of the power applied to the wheel-shaft.

Reference was made, for comparison, to the performances of Appold's pump, and of

Barker's mill, as tested by Mr. W. M. Buchanan, of Glasgow. After suitable allowances were made, corresponding to the loss at the nozzles, and the loss by elevation of water, the following per centages of useful effect were arrived at:—Ruthven, 64 per cent.; Appold, 57 per cent.; Barker, 67·8 per cent., giving a mean of 63 per cent. of the power applied to the wheel-shaft.

The friction of the engine was taken at 20 per cent. of the indicated power on the piston, leaving 80 per cent. delivered at the wheel-shaft. It therefore appeared, finally, that of the whole indicated power of the engine, as applied to work Ruthven's propeller, 50 per cent. was lost by friction and other causes, leaving a balance of 50 per cent. for useful work done.

It was further argued, that by careful design, and good proportion of parts, so as to reduce the friction of the machine, the excess of velocity of the effluent water, and the elevation of the nozzle, 70 per cent. of the total indicated power of the engine might be utilised by Ruthven's propeller.

The draught of the vessel, during the trial, was stated to be 3 feet 2 inches, and the immersed midship section 40·5 square feet. The united area of the nozzles being 1·09 square feet, the ratio of the area of propulsion to the immersed section was 1 to 37. To the load water line, the immersed midship section was 55 square feet, and the ratio 1 to 50.

Many advantages of Ruthven's propeller, for large vessels, were pointed out and contended for. Several nozzles could be applied to one vessel, one acting for another in case of accident; whereas paddles and screws could not be so multiplied, and a number of engines and nozzle-propellers, of moderate size, worked at high speeds, would, it was contended, be less weighty, more compact, and more manageable, for a large vessel, than the huge engines and appurtenances required on the present system.

The discussion was adjourned until the following Tuesday.

COMPOUND ACHROMATIC MICROSCOPES.

At a recent meeting of the Royal Institution, a lecture was delivered by Charles Brooke, M.A., F.R.S., surgeon to the Westminster Hospital, on the Construction of the Compound Achromatic Microscope. Mr. Brooke stated his motive in giving the lecture to be an observation frequently made, that many who are in possession of the best microscopes, either for the purpose of pursuing original investigations, or of seeking rational recreation in acquiring a knowledge of the structure of natural objects, do not develop the full power of their instruments from a want of sufficient acquaintance with the principles on which the definition of objects depends.

After briefly adverting to the ordinary phenomena of reflection, the lecturer illustrated those of refraction by a moveable diagram, which readily explained the total reflection of a ray of light incident on the common surface of two media at an angle greater than the *critical* angle, corresponding to which the angle of refraction is 90°.

The aberration of rays reflected or refracted at a spherical surface was then alluded to; and although the reflectors employed in microscopes may be rendered free from spherical aberration by giving them an elliptic, and those of telescopes a parabolic form, there is no practicable method at present known of constructing lenses otherwise than with spherical or plane surfaces; and from the difficulty of obtaining sufficiently perfect reflecting surfaces, and of preserving them when obtained, refracting microscopes are now almost universally employed.

Chromatic dispersion was then mentioned, and the usual mode of producing achromatism by the combination of various kinds of glass, which differ in their dispersive power, was illustrated by a combination of three prisms. The construction of achromatic object-glasses was next explained, as well as the nature of the aberration produced by the presence or absence of a plate of thin glass covering the object, and the mode of correcting it in object-glasses of high power, by varying the distance of the anterior from the posterior combinations, as first extensively applied in practice by Mr. A Ross, and fully detailed in his article on the Microscope in the *Penny Cyclopædia.*

The angle of aperture of object-glasses was then explained, and the power of those of large angular aperture in developing the structure of certain test objects, such as the siliceous shells of diatomaceæ, was explained to be totally distinct from the mere increase of the amount of light transmitted. Mr. Brooke offered an hypothesis as to the structure of these objects, from which it would follow that that structure would be rendered visible by oblique rays *alone*, and the necessary degree of obliquity would depend on the smallness of the elevations on the undulating surface of the shell. This view was thus shown to be highly probable; a specimen of the Pleurosigma formosum (first found by Mr. Brooke at Walton-on-the-Naze), was viewed under a half-inch object-glass by Ross, and an achromatic eye-piece of high power, (which was stated

to be unquestionably superior to a deep Huygenian eye-piece); when an opaque disc was interposed between the object and the centre of the object-glass, which cut off a large portion of the central rays, the diagonal rows of dots were still distinctly visible; but when the marginal rays were stopped out by a diaphragm, although a much larger quantity of light was admitted than in the former case, the markings were entirely lost.

In order to render visible the more difficult objects of this class, glasses of large angle of aperture have been constructed, but their employment is much limited, owing to the greatly increased difficulty of correcting the aberrations, under any given circumstances of the transmitted pencil of light, and consequently the small amount of correction, that is, of adaptation to altered circumstances, that they admit of. From investigations which he knew to be in progress, the lecturer expressed a hope that by due adjustments of the illuminating pencil, the most difficult test-objects would be rendered equally visible under object-glasses of moderate aperture, which are much more generally useful.

Mr. Brooke then alluded to the preposterous reputed angle of aperture of certain foreign object-glasses, viz., 172°, and explained the fallacy of the ordinary method of determining that angle, which consists in viewing through a microscope the light of a lamp placed at a few feet distance, and moving either the light or the microscope, so as to traverse the entire angular distance through which the light is visible. In this method the course of the rays is contrary to their usual course, and oblique pencils may be brought to an imperfect focus at the back of the object-glass, and produce a glare of light, but which meet at a greater angle than the extreme rays that can enter the object-glass *from the field of view*, and which consequently are the extreme available rays.

A very perfect instrument for measuring the angle of aperture, designed by Mr. Gillett, was then explained: this consists of two microscopes, the optical axes of which may be adjusted to coincidence. One of these is attached horizontally to the traversing arm of a horizontal graduated circle, and is adjusted so that the point of a needle, made to coincide with the axis of motion of the moveable arm, may be in focus and in the centre of the field of view. The other microscope, to which the object glass to be examined is attached, is fixed, and so adjusted, that the point of the same needle may be in focus in the centre of its field. The eye-piece of the latter is then removed, and a cap with a very small aperture is substituted, close to which a lamp is placed. It is evident that the rays transmitted by the aperture will pursue *the same course* in reaching the point of the needle, as the visual rays from that point to the eye, but *in a contrary direction*, and being transmitted through the moveable microscope, the eye will perceive an image of the bright spot of light throughout that angular space that represents the true aperture of the object-glass examined. The applications of this instrument in the construction of object-glasses are too numerous to be here detailed: amongst the most obvious of which may be mentioned the ready means it presents of determining the nature, and measuring the amount of the aberration in any given optical combination.

The important subject of illumination was then so far considered as the short space of time allotted to the discourse would permit. It may be taken as an axiom that in the illumination of transparent objects, the amount of definition will depend on the accuracy with which the illuminating rays converge upon the several points of an object; consequently the source of light and the field of view must be the *conjugate foci* of the illuminator, of which an achromatic combination, similar to an object-glass, is the best form, and the common mirror usually employed is probably the worst, inasmuch as in a pencil of rays obliquely reflected at a spherical surface, no focal point exists.

The first compound microscopes on record, as those of P. Bonnani, about 1697, which was placed horizontally, and that of J. Marshall in the beginning of the eighteenth century, which was vertical, were furnished with central condensers, but in later years the perfection of the illuminating apparatus has by no means kept pace with that of the ocular portion of the microscope, though scarcely of less importance, in attaining the utmost practicable perfection in the vision of microscopic objects.

The advantages of employing an achromatic condenser were first pointed out by Dujardin, since which time an object-glass has been frequently, but inconveniently employed, and more recently achromatic illuminators have been constructed by most of our instrument makers.

Some years since Mr. Gillett was led by observation to appreciate the importance of controlling not merely the *quantity of light* which may be effected by a diaphragm placed anywhere between the source of light and the object, but the *angle of aperture of the illuminating pencil*, which can be effected only by a diaphragm placed immediately behind the achromatic illuminating com-

bination. An elastic diaphragm, or *artificial pupil*, as it might be called, was first proposed by Mr. Brooke, which was shown to answer very well in a large model, and produced a remarkable semblance of vital contractility; but mechanical difficulties interfered with its application, and the revolving diaphragm in the instrument, now well known as Gillett's condenser, was substituted.*

When the rays of light converging on the field of view meet at a greater angle than that of the extreme rays that can enter the object-glass, the dark-ground illumination is produced, in which the objects are seen in strong lines of light on a dark ground; this is best suited to objects having a well-marked outline, such as the spicula of sponge, or the shells of the polygastrica. This may be effected either by Wenham's truncated parabolic reflector, or by a central opaque stop in Gillett's condenser.

The value of this kind of illumination in certain cases was shown by its effect in rendering visible the persistent cell-walls in a specimen of hard vegetable tissue, a section of a plum-stone, which could hardly be distinguished by the ordinary or bright-ground illumination.

A white cloud brightly illuminated by the sun has long been recognised as the best source of illumination; but as this is not often obtainable, the light of a lamp thrown upon a flat surface of plaster of Paris, or powdered carbonate of soda, has been used as a substitute. A flat surface of white enamel, finely ground, but not polished, has been used with advantage by Mr. Gillett, as the surface can always be rendered perfectly clear by a little soap and water. By either of these means the glare resulting from throwing the unmodified light of a lamp on the object is completely obviated.

The effect of glare or diffused light in interfering with the vision of an object was illustrated by reference to an experiment of Professor Faraday's, in which a screen of gauze partially blackened is held in front of a printed placard or diagram; the diffused light reflected from the white gauze considerably obscures the object, which is scarcely interfered with by the blackened portion.

The influence of illumination upon definition was rendered very evident by placing the two halves of a fly's tongue, similarly mounted, under two microscopes having precisely similar object-glasses and eye-pieces; the one was carefully illuminated by an achromatic condenser, and artificial white cloud; the other, by the light of a similar lamp reflected from a concave mirror: the difference was so conspicuous, that some were inclined to doubt the identity of the objects.

* A description of this very useful apparatus has been recently published in the "Elements of Natural Philosophy," by Golding Bird and Charles Brooke.

WILLARD'S PATENT CHURNS.

(Patent dated February 23, 1853.)

Mr. Asa Willard has patented a very ingenious and useful machine by means of which butter can be manufactured from cream, the butter-milk thoroughly worked out, and the butter salted and afterwards gathered up without any necessity for touching the butter by the hand.

Fig. 1 of the annexed engravings is a vertical transverse section of the interior of the receiver of Mr. Willard's machine, for containing the cream and the dasher; fig. 2, a longitudinal section of the machine in its complete state. A represents the reservoir for containing the cream; the bottom and sides, *a*, of the said reservoir being made in its cross section in the form of the arc of a circle, in order to adapt it to the revolving dasher, B; the bottom and sides are formed of thin sheet metal, and surrounded by a space, C, in which cold or warm water may be put, for the purpose of either increasing or diminishing the temperature of the cream and (when churned) the butter at pleasure. The water-chamber, C, is provided with one or more lids or doors, *b*, *c*, placed on its upper part; and it also has a discharge-tap, *d*, extending out of its lower part. The main reservoir has also a discharge-tap, *x*. Each head of the dasher is composed of two bars, *e*, *f*, which, instead of being arranged to cross each other at right angles, are made to do so at acute angles and obtuse angles; they are connected together by two or more cross-bars, *g*, *h*, extended from one head, D, to the other, E. The two ends of each of the bars, *e*, *e*, of each head are curved in opposite directions, and made to support curved floats, *i*, *k*, whose transverse curve or shape is shown in the figs. They are curved thus in order to force the cream towards the centre of the machine during the revolutions of the dasher, in the direction of the arrow, and also to aid in separating the butter from the butter-milk, and gathering the former together when the dasher is rotated in the opposite direction. A moveable float, H, I, is also applied to each float, *i*, *k*, in the position shown in fig. 1, it being hinged or jointed to the heads in such manner as to

be capable of either assuming and maintaining the position seen in H, when open, or I, when shut. These moveable floats, when open, and while the dasher is revolved in the direction described by the arrow, divert the currents of cream set in motion by the curved floats, *i*, *k*, or change their directions, so as to produce thorough and effective agitation and oxygenation of the cream. The front or extreme outer surface or edge of each float, *i*, *k*, is curved longitudinally, as seen, the object of which curve will be hereafter explained. The bars, *f*, *f*, of the dasher serve to support the two revolving fluted rollers, R, S, which should be so connected to the bars as to be capable of a free revolution on their axis; they are fluted longitudinally, and the flutings should be made either of an unequal size in cross section, that is, of an unequal width at the chords of the curves in each individual roller, or each individual flute may be the same in its respective roller, but different in size and number from those of the opposite

Fig. 1.

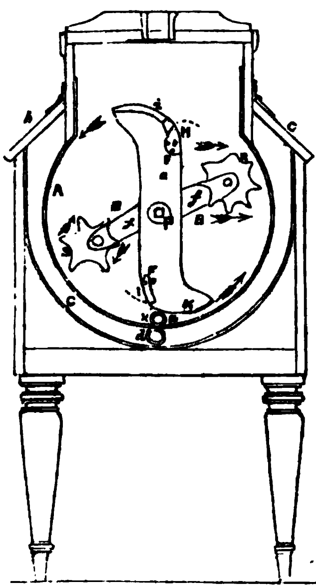
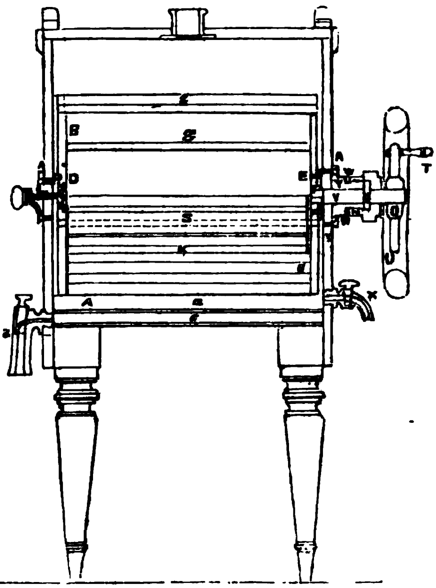


Fig. 2.



roller supported by the other ends of the bars. The number of flutes may vary from five to seven. While these fluted rollers serve to agitate the cream, they are also for the purpose of scoring or indenting the butter, when laid upon the curved bottom of the machine, and working the salt into it, while the dasher is rotated in a direction the reverse of that exhibited by the arrow. While each of them thus throws it into ridges, the outer curved surface of the succeeding floats, *i* or *k*, on being immediately afterwards brought into contact with the butter, smooths down or takes out such ridges; and, in consequence of the longitudinal curve of the floats, a gathering of the butter will take place in such manner as to leave the butter crowning in the middle. The extreme ends of one of the floats, *i* or *k*, should be made to run nearly, but not quite, in contact with the curved bottom of the machine, while the middle of each float, in consequence of this longitudinal curve, moves at a greater distance from the bottom and sides. The object of the curve is to prevent the butter from gathering on and adhering to the ends of the cream reservoir, as well as on the dasher; the layer of butter is thus curved, or thrown up gradually, from its ends towards its middle. Thus it will be seen, that by the conjoint action of the fluted rollers and the floats, the butter is wrought or made to move in two opposite directions, while it is spread on the bottom of the machine, and this peculiar operation most thoroughly and effectually commingles the salt with it. By placing each fluted roller as near as can be to the outer curved surface of the curved float, *i* or *k*, without interference with the opening of the moveable or hinged float of such fixed float, the distance

between such roller and the other float is greater than it would be were the arms of each of the dasher-heads arranged at right angles to one another; consequently, after the spreading action of each float on the butter, a greater spread or surface of the butter is exposed to the salt solution before the action of the fluted roller takes place than there would be were the arms arranged at right angles to one another; or, in other words, were each of the fluted rollers placed equi-distant between the two floats, *i*, *k*. The two ears or plates, F, represent metal plates screwed and let in to the outside of the bars, *e*, to receive the ends of pins or rods, on which the moveable floats work, which plates may be dispensed with by having projections in the wood. The central circle, P, represents one of two plates of metal screwed and let in to the outside of the cross-bars to strengthen their junction, and receive in a central circular socket a circular pin shown at L, fig. 2, on which one side of the dasher revolves. The other plate, at the opposite end of the dasher, receives in a central square socket the square end or key of the shaft, V, as seen in fig. 2, which shaft, V, communicates the required motion to the dasher, the dasher being made to revolve by means of a crank-wheel, U, attached to one end of the shaft, V, keyed into one end or head of the dasher, as before described, which shaft passes through and turns in a bearing, Y, on the side of the reservoir.

THE CONICAL FLOUR-MILLS.

Since we last noticed this most valuable invention, it has been making rapid progress both at home and abroad. The Austrian patent has been sold for £30,000. A large mill has been erected at Vienna, and is in full work. Another has been built for Lord Portman, at Bryanstone, Dorset, which grinds 8½ bushels per hour against an ordinary mill belonging to his lordship, which grinds 2½ bushels, and the same power (water) does for both. The magistrates of Hampshire are erecting a mill in the county gaol at Winchester, and in Ireland Lord Talbot de Malahide, the celebrated Mr. Dargan, and others, take a most lively interest in its adoption in that country. In fact, the restoration of the flour-trade, Mr. Dargan has declared, is "the wish nearest to his heart." In France Prince Murat has become the president of a committee consisting of the Marquis de la Rochejacquelin and other eminent men, to carry it out. New foreign patents are continually being obtained, the last, making twenty-nine in the whole, being for Spain, Portugal, Tuscany, and Egypt.—*Liverpool Mercury.*

EXTINCTION OF FIRE.

To the Editor of the Mechanics' Magazine.

Sir,—I read, with much surprise, the communication of "Homo," at page 276 of your last Number, in which he says, "It was painful to witness the inefficiency of most of the fire-engines employed at the late fire at the *Papier Maché*-works, in Wellington-street, Strand, for want of an apparatus for conducting the engine hoses nearer to the buildings on fire." A more mistaken view of the matter cannot be imagined; no such inefficiency was witnessed—no such want was felt.

I was on the spot almost immediately after the outbreak of the fire, with two *fire-escapes*, which furnish most ample means of doing what "Homo" requires; indeed, one was so used. The hoses of several of the Brigade engines were taken up the stairs of the building, directly into the floors in which the fire was raging; others were placed upon the roof. The hose of the *West of England* engines was taken up the fire-escape on to the roof of the opposite house, in Exeter-street, on a level with the windows of the floor in which the flames were strongest, and poured a powerful stream of water into the heart of the fire. One of the Brigade hoses was subsequently stationed in the same spot. On first going to work, the West of England engine threw a jet from the street, over the parapet of this lofty building, a performance which elicited shouts of applause from the crowd who witnessed it. With the exception of a small parish engine (St. Mary-le-Strand), whose puny efforts to reach the fire excited much laughter, no other engine attempted to throw a jet from the street. When the peculiarities of this building, the spot in which the fire originated, and the head it had attained before discovered, are considered, its speedy suppression reflects the greatest credit upon the firemen engaged, and completely negatives the idea of any *painful inefficiency!*

If "Homo" will turn to some of your earlier volumes, he will see that apparatus for the elevation of the hose has already been invented. In vol. xix., page 50, there is a description of Mr. Rose's fireman's elevator; in vol. xxvi., page 114, a similar apparatus is described, invented by Captain Smith. In Mr. Braidwood's work on Fire-engines, three other kinds of apparatus for elevating hose are noticed, as having been tried in Edinburgh.

But Mr. Braidwood states, that "Although

these inventions may be exceedingly ingenious, their claims to be considered useful appear to me to rest on a principle entirely wrong. I mean that of throwing water on the fire from the outside of the building." Whenever such an apparatus can be usefully employed in the metropolis, it is now almost always at hand, in the Royal Society's fire-escapes, which are at all times available for this purpose, and have upon several occasions been conspicuously useful.

It frequently happens, as it did upon the occasion herein referred to, that although a large number of engines are in full work, yet, from their powers being *internally applied*, the lookers on can see nothing of what is doing. Mr. Braidwood's principle of action is (quoting his before-named work), "to get so near the fire, inside the house, that the water from the director may strike the burning materials."

I am, Sir, yours, &c.,
WM. BADDELEY.

13, Angell-terrace, Islington, March 27, 1854.

LIPSCOMBE'S IMPROVEMENTS IN SHIPS.

To the Editor of the Mechanics' Magazine.

SIR,—"N. B." has given up the discussion relative to my improvements in ships, and winds up his communication by stating that he experimented upon two models of equal size of the *American*, with an equal amount of sail; one sailed bow foremost, the other stern foremost, and he found the model that went stern foremost attained a greater speed than the other. I have merely to say, that toy models of ships are in the highest degree delusive; their performance, as regards speed, is the reverse of what actually takes place in the real ships, and I have no doubt the non-discovery of this fact has hitherto prevented the best form for ships being arrived at. "N. B." will find that as he increases the size of the models up to a certain point, their speed will become more uniform; and the more their size is increased beyond that point, the more the model going bow foremost will exceed the speed of the other.

"A Constant Reader" has entered the field, with his calculations relative to the resistance met with by the incline planes, C, D, E (page 217). "N. B." gave us two calculations, which differed from each other; and the calculations of "A Constant Reader" differ from them and my own. He makes out a resistance against D and E, respectively, of only 1,600 lbs. and 470$\frac{10}{9}$ lbs., instead of my numbers, 2,000 lbs. and 1,000 lbs.; consequently, he makes out my plan to be more favourable than I do myself. But as his calculations show a result so different to the result of my own experiments, and as his method of calculation is quite untenable, I have no hesitation in stating that he is incorrect. I am happy to say, my plan daily meets with increased favour; and I feel as confident as ever that my trial-boat of 50 tons, which, I hope, will be launched the latter end of April, will equal the expectations that have been formed of her.

I am, Sir, yours, &c.,
FREDERICK LIPSCOMBE.

Temple-bar.

ASCENSION IN BALLOONS.

To the Editor of the Mechanics' Magazine.

SIR,—Allow me to reply to the letter of your correspondent "J.C." that appeared in No. 1597 of your valuable Magazine, for apparently he has somewhat changed his opinion on the question. He now says, "He has a further statement to make which he had neglected to insert in his former letter, in answer to 'Senex,' viz., that far from affording any facility to the ascent of the balloon, such a motion being given to the weight will absolutely cause the balloon to *descend*, or would to a certain degree *retard its ascent* if ascending." Now, I need scarcely say, were this possibly a fact, its application in aërostation would be of quite as much importance as if the balloon were relieved of part of the weight, and with that view "to make an experiment to obtain at least the effect of such a movement, would not, it would be thought, be superfluous."

As regards the equation,

$$P.CP = T. \sin \angle FAW' AC,$$

which "J. C." gives in "as expressing the equation of moments of the system in equilibrium, correctly taken," it can only apply to the case when the weights are in motion; but when they are brought to a rest, we can have no other than the expression

$$P.CP \angle W' CF,$$

showing that since the system is in equilibrium, only when in motion; the weight, in my position, is greater at rest, than when in motion and affected by the centrifugal force.

But since he says "I *assume* that the system will always be in equilibrium about C," I must, I suppose, understand him now as implying that the effect of the centrifugal force will be such, that the tension, when the system is in motion, will equally or as much affect P through C, as the weight in the same position when at rest. If such be his

purpose, all that can be said to it, is, that it is in direct opposition to the great law of motion he upholds, "that two forces acting perpendicularly to one another no more oppose than they assist one another." How he intends to keep in accord with this and yet maintain his now altered view of the question, is more than I can imagine. Perhaps he will be kind enough to explain; and we will allow as inadvertent the admission that his equation expresses the conditions of the case in equilibrium.

As the simple view that I take of the question appears not be understood by "J.C.," I must beg your indulgence, Sir, to express it once again as clearly as I can.

I. That it stands to reason, that it is absurd to assume the weight as raised to any position, by the centrifugal force acting in the direction of the radius of the curve in which it moves, since it is impossible for the weight to be affected by that force till the weight has before been raised to that plane.

II. That, as we know that the weight is raised to its position from the excess of the centrifugal force while rotating round a lower centre, it must be connected with that lower position, and dependent on a force therefrom; that is to say, carrying out the argument, it is therefore always acted upon by a force acting from the position that it started from. If there is any fallacy in this, by "J. C." pointing it out, he will oblige, Sir,

Your most obedient servant,

A.

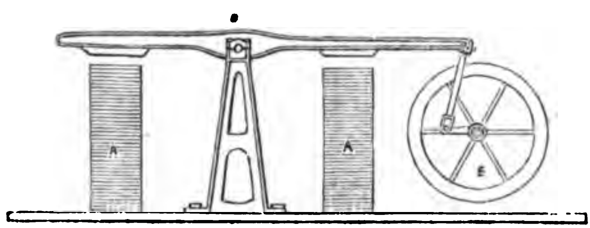
London, March, 1854.

ELECTRO MOTIVE POWER ENGINE.

To the Editor of the Mechanics' Magazine.

Sir,—I have just read your description of Allan's electro-magnetic engine, and I beg to direct your attention to a more simple application of the same plan, as briefly described in Sewell's second volume, on "Steam and Locomotion," (J. Weale, 1853,) as having been shown by Mr. William Beckle, at the Swindon Mechanics' *soirée* January, 1853, and again at the *conversazione* of the President of the Institute of Civil Engineers, in 1853.

That its mode of action may be clearly understood, the accompanying diagram is given, where A A are two electro magnets,



one on each side of the fulcrum of the beam or lever, B, connected in the usual way to the fly-wheel, F. Over each of the magnets, A, the beam has a broad palm within the full power action of the magnets, so that by increasing or decreasing the relative length of the fly-wheel and of the beam, the stroke is increased or decreased at pleasure, and the full power of the magnets obtained with very little friction.

With a single jar, the speed attained by the fly-wheel was very great, resembling the highest velocity of fans, with the same buzzing sound. The model was quite small, and the fly-wheel about 3 inches or 4 inches diameter, with four small electro-magnets, and a lever on each side of the fly-wheel, of which the diagram represents one lever and one pair of magnets.

I know not when the model was made, but I first saw it at the Swindon Mechanics' *soirée*, January, 1853; and, struck with its effective simplicity as an electro-magnetic steam-engine, I afterwards was instrumental in having it shown at Mr. Rendell's *conversazione* last year.

J. Sewell.

Spring-street, Sussex-gardens, March 25, 1854.

The National Drawing Master, and Self-Instructor's Practical School of Design. Part I. By W. A. NICHOLLS. London: Wesley and Co.; Paternoster-row.

This is the first of twelve monthly parts, which are to comprise a series of lessons in the art of drawing. The system adopted by the author consists in providing the student with copies and drawing-paper divided by red ink lines into similar and equal squares, which are again divided by similarly disposed dots. These dividing lines and dots are intended to serve as guides for the student in imitating the copy. We have no doubt that the method, if judiciously employed, will considerably facilitate the progress of many in the art.

Templeton's Millwright and Engineers' Companion. Tenth Edition, corrected and improved by, SAMUEL MAYNARD. Simpkin, Marshall, and Co.

We are pleased to find that this very useful work has reached a *tenth* edition. Having already expressed at length our sense of its great merits, we need not now do more than commend it again to those of our engineering readers who are not yet possessed of it.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

WARNER, ARTHUR, of Dorset-place, Dorset-square, London, Middlesex. *The application of the fibrous part of the palm-tree and leaf to arts and manufactures.* Patent dated September 10, 1853. (No. 2089.)

Claim.—"The application of the fibres drawn from the palm-tree and its leaves to the manufacture of threads and woven fabrics, and of paper, pasteboard, and card."

GRIST, JOHN, of Islington, Middlesex, engineer. *An improved stave-jointing or shaping machine.* Patent dated September 10, 1853. (No. 2092.)

Claim. — A machine for jointing or shaping staves, in which the blanks are caused to oscillate, turn, or rock upon a centre, either vertically or horizontally, between a pair of circular saws or cutters made to travel from end to end of the machine.

LEYLAND, EDMUND, of St. Helen's, Lancashire, builder. *Improvements in apparatus for the manufacture of sulphuric acid.* Patent dated September 10, 1853. (No. 2094.)

Claim.—"The application and use of brick chambers for the formation and condensation, or the actual manufacture of sulphuric acid."

GILBERT, THOMAS, of Limehouse, sail-maker. *Improvements in sewing sails and other articles.* Patent dated September 10, 1853. (No. 2095.)

Claim.—Arranging sewing machines, in combination with other apparatus, in such manner as to admit of the sewing machines being moved as the stitches are progressively made, while the fabric sewn remains stationary.

TRONSON, ROBERT, of the Chamber of Commerce, Liverpool. *Improvements in ventilating and preventing spontaneous combustion in ships and other vessels laden with coal, culm, or cinders.* Patent dated September 10, 1853. (No. 2097.)

This invention consists in distributing numerous perforated tubes placed in different positions throughout the cargo, for the purpose of conducting the gases generated by it out of the ship.

METCALFE, THOMAS, of High-street, Camden-town, Middlesex *Improvements in portable chairs and tables.* Patent dated September 10, 1853. (No. 2098.)

At the back of the chair described by the inventor, there are two uprights parallel to each other, to which the flexible back is fixed. The seat is supported by two side rails with inclined legs, which cross each other at the front and back, like those of a camp-stool, and the back legs are jointed or hinged to the lower parts of the uprights. The side rails rise and fall on the uprights, inclosing and opening the chair or seat.

WARD, JOHN, of Saville-house, Leicester-square, and EDWARD CAWLEY, of Stanley-street, Chelsea. *Improvements in chairs, couches, and tables.* Patent dated September, 10, 1853. (No. 2100.)

In this invention the seat of a chair or couch is formed on the front end of a lever-frame, the back or lower end of which is hinged to a lower frame, or base plate; and the back is formed at the upper part of another lever frame which, at its lower end is hinged towards the front of the base plate or lower frame.

MARKS, JOSEPH, and JOHN HOWARTH, of Massachusetts, United States. *Certain new and useful improvements in machinery or apparatus for operating the breaks of a train of railway carriages.* Patent dated September, 10, 1853. (No. 2101.)

In this invention the breaks are thrown into action by means of the rotation of a windlass shaft that is turned by springs, which are set free when the engine driver pulls a line connected with a ratchet that holds them when the breaks are out of action.

WEILD, WILLIAM, of Manchester, Lancaster, engineer. *Improvements in lathes and apparatus connected therewith for cutting, turning or boring wood, metal, or other substances.* Patent dated September 12, 1853. (No. 2103.)

The first and chief part of this invention relates to lathes, and consists in simplifying the arrangement of slide screw-cutting and similar lathes, so as to render them more handy without diminishing their capabilities.

CHILD, JOHN WRIGHT, of Halifax, York, and ROBERT WILSON, of Low Moor Ironworks, engineers. *Improvements in valves and pistons.* Patent dated September 12, 1853. (No. 2104.)

One part of this invention consists in inclining the slide-sides of the steam-ports and the valves at an angle to the plane of motion, so that by changing the position of the valve transversely the period of its stroke may be altered. Of the remaining features of the invention the chief appears to be the forming of a metallic packing for pistons, of compressed rings, having triangular sections.

LILLEY, JOHN, jun., of Jamaica-terrace, Limehouse, Middlesex, nautical and mathematical instrument maker. *Improvements in mariners' compasses.* Patent dated September 12, 1853. (No. 2107.)

This invention consists in protecting the compass from the vibrations of the vessel by suspending the outer ring of the compass by elastic bands.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved manufacture of printing-blocks and cylinders.* (A communication.) Patent dated September 12, 1853. (No. 2110.)

The moulds are formed by the patentee of rectangular prisms of different lengths. These types or prisms are set up in such manner that the short ones shall form the sunken part of the mould, and the long ones the raised portion, so that when the material of which the block is to be formed is cast into the mould, the elevated part of it shall form the depressed part of the block, and the depressed part of the mould shall form the raised or figured part of the block.

BROCOT, LOUIS ACHILLE, of Paris, France, clog-manufacturer. *An improved construction of astronomical calendar.* Patent dated September 12, 1853. (No. 2111.)

This invention consists in an arrangement of mechanical parts combined into one instrument for indicating the days of the week and month, the phases of the moon, the equation of time, and the hour of the rising and setting of the sun for every day of the year.

CANNON, CHARLES, of Dance-street, Liverpool, Lancaster, chair-maker. *Improved machinery for obtaining motive power.* Patent dated September 12, 1853. (No. 2112.)

Mr. Cannon, after stating in his specification that inventors have previously, but unsuccessfully, endeavoured to obtain motive power from fly-wheels (!) goes on to say, that by suitably arranging a pair of fly-wheels, whose rims are of varying thickness, they may be kept in continued motion by the aid of a very slight impetus given to their shafts at each revolution.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *Improved machinery for crushing and grinding mineral and other substances.* (A communication.) Patent dated September 12, 1853. (No. 2113.)

Claim.—"The construction and use of machinery for the grinding, pulverizing, or crushing of mineral or other substances, wherein the centrifugal action of a ball or balls revolving around a common axis is employed, in conjunction with a rotating shell or vessel for containing the substance to be operated upon, which substance, by the rotation of the said vessel, is properly distributed and held against the periphery thereof by centrifugal action."

DUBS, HENRY, of Vulcan Foundry, near Warrington, Lancaster, engineer. *Improvements in the methods of forging or manufacturing iron and steel.* Patent dated September 13, 1853. (No. 2116.)

This invention consists in forging iron and steel by means of gradual compression instead of sudden blows, hydraulic pressure being employed.

⁂ The final specification of this patent was not filed by the 13th of March, the day it was due, but has been subsequently lodged, the Lord-Chancellor having granted a petition for an extension of the time of filing, the plea of the petition being that the specification had been detained at the Post-office in consequence of its having been deficiently stamped by the patentee's agent.

SINGTON, ADOLPHUS, of Manchester, Lancaster, merchant. *Certain improvements in machinery or apparatus for grinding or setting doctors used in calico and other similar printing machinery.* (A communication.) Patent dated September 13, 1853. (No. 2117.)

The apparatus employed consists of a frame grooved or fluted upon the top, and carrying a travelling-carriage furnished with a setting-tool, which is actuated by means of a chain and pulley, to which rotatory motion is communicated from a winch-handle by means of spur-gearing; the

"doctor" is secured by clamps or fastenings at each end of the frame, and is raised or lowered to meet the tool.

ALLEN, ALEXANDER, of Crewe, Chester, engineer. *Improvements in locomotive and other boilers for generating steam.* Patent dated September 13, 1853. (No. 2118.)

Among other things the inventor *Claims*—1. "Boilers having fire-boxes, cylindrical in form in one part, and bell-mouthed to the form of the tube-plate to admit of the greatest possible number of tubes." 2. The use of a water space between the end of the fire-box and the front end of the boiler. 3. The use of a sliding-cover or door to the furnace orifice.

DICKSON, JAMES HILL, of Evelyn-street, Lower-road, Deptford, Kent, flax manufacturer and flax machinist. *Improvements in machinery or apparatus for the preparation of flax and similar fibrous material.* Patent dated September 13, 1853. (No. 2119.)

This invention consists of a machine, or a system of two or three machines, each having a large centre roller driving a suitable number of smaller ones, the distance between their surfaces being adjusted by moveable plummer blocks and springs; the rollers are provided with a rim or flange to prevent their working too close to each other, and the centre roller is in some cases open between the teeth.

BEHRENS, JACOB, of Bradford, York, merchant. *Improvements in the manufacture of zinc.* (A communication.) Patent dated September 13, 1853. (No. 2120.)

The object of this invention is the combination of the process of zinc-making with the production of coke from coal. For this purpose a series of retorts or muffles are set either above or in communication with a coke oven, in such manner that the heat caused by producing coke in the oven acts on the retorts or muffles and heats them.

SMITH, WILLIAM, of Woolstone, Bucks, farmer. *Improvements in implements for tilling and preparing land for crops.* Patent dated September 13, 1853. (No. 2121.)

This invention consists in forming a subsoil plough, by combining three implements used for tilling and otherwise preparing land, into one. Each of the three frames or bodies has a wheel capable of adjustment, and three draft-rods or chains are connected by links in front to a bar, which receives the whippletree. This bar has chains or links which pass from it through adjustable eyes placed near to the guiding handles.

GODDARD, EMERSON, of New York, United States. *Improvements in machinery for cutting stone.* Patent dated September 13, 1853. (No. 2122.)

Claims.—1. A cutting apparatus, consisting of a double bar or guide, a bent cutter, a shank, and springs. 2. In combination with the above, a mode of throwing the cutter out of or into gear, and varying the angle of the cutting edge, as required. 3. The use of two sets of cutters in one frame, so as to cut either way readily.

POOLE, MOSES, of the Avenue-road, Regent's-park, Middlesex. *Improvements in apparatus and means for removing matters or heat from currents of air, gases, or vapours, or from liquids, and for communicating matters or heat to the same.* (A communication.) Patent dated September 13, 1853. (No. 2123.)

Claims.—1. "The removal of foreign matters or heat from and the communication of foreign matters or heat to currents of air, gases, or vapours or liquids, by means of sheets or masses of porous material kept constantly wet or washed, or heated or cooled, and intercepting the current or passing through the liquid," as described. 2. The use of certain described apparatus.

LAMING, RICHARD, of Millwall, Poplar, Middlesex, chemist. *An improved process for purifying gas* Patent dated September 13, 1853. (No. 2124.)

Claim.—"The purification of gas by saturating its carbonic acid with ammonia, either alone or combined with hydrosulphuric acid, or even combined with sulphuric acid in less quantity than it can absorb, and afterwards removing the resulting carbonate of ammonia, in conjunction with the further purification of the gas from free hydrosulphuric acid, by any effective oxide of iron."

WAKEFIELD, JOHN, of Inchicore Works, Dublin, engineer, and JAMES BASKERVILLE, of the same place, engineer. *Improvements in, and applicable to valves for reciprocating engines driven by steam or other elastic fluid.* Patent dated September 14, 1853. (No. 2125.)

Claim.—The substitution for the ordinary means of working the slide valves of engines of a single eccentric sheave, or wheel composed of one portion, which is fixed to the crank shaft, and another moveable over it, the latter being capable of working the valves (according to the position in which it is placed), by means of a strap and rod.

WILSON, JOHN, of the firm of Messrs. Heald, Wilson, and Co., of Manchester, calico-printers. *Improvements in and applicable to machines for printing fabrics.* Patent dated September 14, 1853. (No. 2126.)

This invention consists—1. In dispensing with the endless woollen blanket usually employed in printing-machines, and substituting in its stead an endless web or piece of calico or other cotton fabric. 2. In the application of machinery for stretching and

tightening the endless web of cotton fabric; and lastly,—in giving motion to the drying cylinders by which the endless web is dried by means of a steam engine or other source of motive power.

WEBLEY, PHILIP, of Birmingham, Warwick, manufacturer. *Improvements in repeating-pistols and other fire-arms.* Patent dated September 14, 1853. (No. 2127.)

This invention consists—1. In forming the driver by which the rotation of the barrel is effected, in rotating chamber fire-arms, in one piece with the stop, which prevents the rotating chamber from moving too far when bringing a fresh one into position; and, 2. In the employment of certain means for insuring close contact between the inner end of the stationary barrel and each charge chamber at the time of firing, or when the hammer is against the nipple, although the two are not in contact when the hammer is withdrawn.

TIMMINS, JOHN, of Stafford, surveyor. *Improvements in safety-valves for boilers.* Patent dated September 14, 1853. (No. 2128.)

The inventor forms a compound valve by making in the boiler two, four, or more openings near to each other, and arranges mechanism by means of which these may be opened or closed simultaneously, a down and an up valve being connected together so as to act in concert, while the down valve has attached to it a float which is wholly or in part supported by the water in the boiler so long as that is kept to the proper level, and which therefore does not, in that case, act upon the valves; but since this float is heavier than the weight required to drag down the valve, whenever by the sinking of the water the float is left suspended to it, the valve is drawn down and the valve-way opened, the other or up-valve which acts in concert with the other being of course opened at the same time.

WALLACE, ALEXANDER, of Glasgow, Lanark, North Britain, and GEORGE GALLOWAY, of the same place, smiths. *Improvements in the construction of portable articles of furniture.* Patent dated September 14, 1853. (No. 2129.)

Claim.—1. A mode of constructing chairs and portable furniture, wherein diagonally folding legs are combined with a sliding folding seat. 2. A mode of constructing chairs and portable articles of furniture wherein the seat or cushion is capable of folding down into the angular recess formed by the junction of the back and legs. 3. The application and use, in the construction of chairs and portable articles of furniture, of traversing cushions or seats actuated by the folding action of diagonal legs.

HIGGIN, JAMES, of Manchester, Lancaster, manufacturing chemist. *Improvements in burning certain fluids for the purpose of obtaining heat.* Patent dated September 14, 1853. (No. 2132.)

Claim.—"The use of tar, or other volatile hydro-carbons, causing them to descend in small streams on a heated surface, where they are inflamed or ignited, and supplied with sufficient air to effect their combustion."

HOOK, CHARLES TOWNSEND, of Tovil House, Maidstone, Kent. *Improvements in the manufacture of pulp.* Patent dated September 14, 1853. (No. 2133.)

This invention consists in distributing, by means of machinery, chemical and other solutions over the surface of fibrous substances when converting them into pulp.

KAY, RICHARD DUGDALE, of Bank-terrace, Accrington. *Improvements in block printing.* Patent dated September 14, 1853. (No. 2134.)

In the methods already in use for printing several colours by one application of the block (technically termed "tobying") the colours have been, says the inventor, "invariably plain, not shaded, and the object has been to keep one colour separate and distinct from another. I propose," he adds, "to unite or mix the colours in regular or definite proportions by modifying the ordinary 'toby' apparatus, and thus to obtain all the effects produced by the usual methods of 'rainbowing,' and many more, with considerable economy."

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in machinery for separating flour, shorts, and dustings, from bran, as it comes from the bolting apparatus.* (A communication.) Patent dated September 14, 1853. (No. 2135.)

"The apparatus," says the patentee, "is sometimes composed of one exterior stationary cylinder and two revolving cylinders so formed and arranged that the interior cylinders rotate in opposite directions and agitate the bran and other stuff subjected to their action, and separate the flour, shorts, and dustings, from the bran, depositing each quality of stuff in different receptacles."

SPENCER, GEORGE, of Cannon-street West, civil engineer. *Improvements in supporting rails of railways.* Patent dated September 14, 1853. (No. 2136.)

This invention consists in applying longitudinal bearers of iron, which are corrugated transversely, in such manner that the rails, whether fixed directly or indirectly to the bearers, are supported by the convex parts of the corrugations; and in some cases the inventor places wood or other bearers below the corrugated longitudinal iron bearers.

BEHRENS, JACOB, of Bradford, York, merchant. *Improvements in generating steam in steam boilers.* (A communication.) Patent dated September 14, 1853. (No. 2137.)

This invention consists in setting one end of a steam boiler, through which a tubular flue runs, in the crown of a coke oven, there being openings or passages from the outer part of the under side of the boiler into the tubular flue, which is closed at the front end and open only at the other. By this means the heat evolved from coal in the process of coke-making passes up the passages into the tubular flue and through it into the stack or chimney, and heats the steam boiler in its passage.

SWINGLER, THOMAS, of Victoria Foundry, Litchchurch, Derby. *Improvements in the permanent way of railways.* Patent dated September 14, 1853. (No. 2138.)

Claims.—1. A peculiar mode of fastening the back rail. 2. A mode of forming the switch so as to avoid notching the back rail and to give room for the cheeks of the chairs between the back rail and the switch. 3. The casting of longitudinal cast-iron sleepers in combination with one chair, the other being detached to admit of adjustment. 4. The construction of crossings for railways by rails or bars attached to or cast in combination with a cast-iron plate.

NASH, WILLIAM, of Burslem, Stafford, whitesmith. *An improved mode of manufacturing china and earthenware articles on the lathe.* Patent dated September 14, 1853. (No. 2139.)

The inventor forms a profile gauge and cutter of thin sheet-steel, bending and setting it so that the shape of its cross section as well as that of its cutting edge corresponds to the profile of the article to be manufactured.

EDWARDS, ELIEZER, of Birmingham, Warwick, manufacturer. *A new or improved gas-stove.* Patent dated September 15, 1853. (No. 2141.)

Claim.—The constructing of a gas-stove, in which the air, vitiated by combustion, is conveyed from the apartment in which the stove is situated by a pipe or flue passing under the floor.

BROWNING, THOMAS, of Pendleton, Lancaster, machinist. *Improvements in machinery or apparatus for washing, scouring, or cleansing woven fabrics, either with plain or pile surfaces.* Patent dated September 15, 1853. (No. 2142.)

Claim.—The construction and arrangement of a machine or apparatus with revolving expanders working in connection with grooved bowls, the top squeezer-bowls being raised by a lever to prevent damage, and the fabric being caused to pass through different waters, provision being made for taking away the dirt which is squeezed out of the cloth.

COMPLETE SPECIFICATIONS FILED WITH APPLICATIONS.

FABECK, FREDERICK WILLIAM ALEXANDER DE, of Norfolk-street, Strand, Middlesex. *The construction of bridges, viaducts, lintels, beams, girders, and other horizontal structures and supports.* Filed February 25, 1854. (No. 460.)

The inventor forms a lintel, beam, &c., of a series of frame pieces arranged and combined so as to inclose a double series of triangular spaces, one above and the other below the middle line of the structure.

BROWN, WILLIAM, of Glasgow, merchant. *An improved mode of obtaining volatile products from bituminous coals and other bituminous substances.* Filed March 3, 1854. (No. 515.)

This invention consists in dispensing with retorts and other similar vessels, and in substituting for them an air-tight furnace, into which the bituminous coals or other substances are introduced, the volatile products being disengaged and obtained from them by means of fire or heat, generated and applied inside the furnace.

NICHOLSON, JOHN, of Dublin, engineer. *Improvements in and applicable to certain descriptions of close kitchen ranges.* Filed March 3, 1854. (No. 519.)

This invention consists in the application to the fire places of close kitchen ranges of a moveable or lifting bottom and a lever, or its equivalent, for raising and depressing it.

TROTMAN, SANDERS, of Portman-square, Middlesex, hydraulic engineer. *An improved alarm night-clock or time indicator.* Filed March 9, 1854. (No. 571.)

This invention consists in substituting a method of illuminating a dial by a night-light placed in front of it for that in which a semi-transparent dial is illuminated from behind.

APPOLT, GEORGE, of Sulzbach, Prussia, and CHARLES APPOLT, of Metz, France. *Improvements in the manufacture of coke.* Filed March 10, 1854. (No. 585.)

The first feature of this invention is the division of the oven space into small compartments by means of partition-walls, so that the heat is caused to penetrate the masses of coal, and effect their carbonization quickly. Another is a method of giving mutual support to the partition walls by a system of immured stretchers, which impart to the oven a sufficient strength to resist perfectly any commotion or pressure. And another part of the invention consists in heating the coals to be treated by means of a turning cylinder,

before the process of forming them into coke is commenced.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

FORSTER, WILLIAM CHARLTON, of Hatton-garden, Holborn, Middlesex, gentleman. *An improved manure.* Application dated September 10, 1853. (No. 2088.)

The inventor burns the refuse bark, called tan, after it has been used for tanning, and hops, after they have been used for brewing beer, into a charcoal and ash. He then prepares equal parts of the bark or tan and coals, and after compressing the two into lumps, dries them; then with the dried lumps burns the first mentioned refuse, and uses the result for a manure.

BRUNTON, JOHN DICKENSON, of Truro, Cornwall, engineer. *An improved apparatus for separating gold or silver from their ores or other matters by amalgamation.* Application dated September 10, 1853. (No. 2090.)

This invention consists in amalgamating and separating metals by allowing the crushed ore to descend to the bottom of a suitable vessel containing mercury.

JONES, STOPFORD THOMAS, of Trigon-terrace, Clapham-road. *Improvements in propelling floating vessels, and in the mode of applying the propellers.* Application dated September 10, 1853. (No. 2091.)

The inventor proposes to place the floats on the stays of the paddle-wheels in short lengths instead of lengths passing from one side of the wheel to the other, and in such manner that they shall resemble a number of steps, so that as only one section will come into the water at the time there will be a less impact and consequent trembling than ordinarily.

SCRAGG, EDWIN, of Buglawton, Cheshire, engineer. *Improvements in steam engines.* Application dated September 10, 1853. (No. 2093.)

This invention consists of an arrangement of a differential cam movement, a duplex set of slide valves, and an adjustable cross head or piston-guide for steam engines of various kinds. The main crank-shaft carries a revolving cam formed on one side, with a projection, diametrically opposite to which is a shallow depression. This cam works in contact with a friction pulley lever set at one end on a fixed centre, and jointed at the other to the induction-valve spindle rocking shaft.

JACOB, CHARLES, of Ingram-court, Fenchurch-street. *Improvements in the manufacture of lime.* Application dated September 10, 1853. (No. 2096.)

This invention consists in manufacturing lime from oyster-shells, by calcining them in the same way as lime-stone is calcined.

WEBSTER, JOHN, of Ipswich. *Improvements in the treatment of fatty and oily matters to render them suitable for the manufacture of candles.* Application dated September 10, 1853. (No. 2099.)

In carrying out this invention the fatty matters "are subjected to the action of Nordhausen acid (preferring temperature of 145° of Fahrenheit), or the vapour of anhydrous sulphuric acid (at the same temperature)," and are subsequently combined with ammonia and distilled.

CHACK, JULES FRANÇOIS, of Castle-street, London. *Improvements in machinery for cutting veneers.* (A communication.) Application dated September 10, 1853. (No. 2102.)

In this invention the wood to be cut is placed in a suitable frame which can rotate on a vertical axis, and which is so arranged that the wood may be raised after each cut through a distance equal to the thickness of the veneer that is to be next cut. The knife employed has a straight edge, and has communicated to it a reciprocating motion, the wood being at the same time caused to rotate.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the transmission of motive power, being an improved substitute for the crank.* (A communication). Application dated September 12, 1853. (No. 2105.)

To the cross head of the piston-rod are attached two vertical racks, which are placed in different planes, each rack gearing into a separate pinion on the main shaft. These pinions are alternately made fast and loose upon the shaft by a self-acting clutch arrangement.

TURNER, EDWARD RUSH, of the firm of E. R. Turner and Co., of St. Peter's Foundry, Ipswich, Suffolk, engineers. *Improvements in grinding mills for farm and other purposes.* Application dated September 12, 1853. (No. 2106.)

This invention consists in the employment of flat or conical discs of cast-iron or other hard metallic substance, the surfaces of each being either flat or otherwise, as required. The discs are contained in a cylindrical box, supported by a frame, through which a vertical spindle, that carries the lower plate passes, and which is actuated by suitable gearing. The lid of the box carries a hopper for the reception of the material to be ground, and a feed-roller and slide are fitted to the bottom of the hopper, to regulate the supply.

MAUDSLAY, JOSEPH, of Lambeth, Surrey, engineer. *Improvements in boilers and furnaces for generating steam.* Application dated September 12, 1853. (No. 2108.)

This invention consists in causing the products of combustion as they leave the

top of the fire to pass down through the fire into the ash-pit, and thence through tubes or flues into the chimney.

ROBISON, JOHN, of Coleman-street, London, merchant, and WILLIAM JACKSON, of Leman-street, Middlesex, engineer. *Improvements in furnaces for effecting the consumption of smoke.* Application dated September 12, 1853. (No. 2109.)

This invention consists in the employment of fire-places divided into two or more parts, or in combining two fire-places, in either case adapting to them a damper or dampers, whereby the products of combustion, after being generated in one fire-place, will be made to pass into the burning mass in another fire-place, and so be consumed.

EWBANK, THOMAS HENRY, of South-square, Gray's-inn, Middlesex, gentleman. *Improvements in the manufacture of terry or looped fabrics, and in machinery for producing the same.* Application dated September 13, 1853. (No. 2114.)

In this invention, the wires upon which the terry or loop is formed are made of an improved shape, and are introduced into the work by means of certain described machinery.

ADAMS, CHARLES FREDERICK WILLIAM GEE, of Middle-street, Cloth-fair, London and GEORGE DAVIS, of Bath-street, Newgate-street, London. *The application of the processes of lithographic and zincographic printing of words, patterns, designs, and marks on metal, glass, wood, and other hard and unyielding substances in sheets, slabs, or flat pieces, with or without the intervention of paper or other flexible material.* Application dated September 13, 1853. (No. 2115.)

In this invention the words or designs intended to be printed are drawn on stone or zinc, in greasy ink, or with greasy crayons, and are afterwards subjected to the action of a solution of acid and water; the stone or zinc is then ready for use, and may be printed from in the usual manner.

COLLINS, JOHN JONATHAN GEORGE, of Philadelphia, United States, engineer. *Certain improvements in steam-engines.* Application dated September 14, 1853. (No. 2130.)

The inventor's specification describes a rocking shaft lever, by which an ordinary slide-valve is supposed to be actuated. The stud of this lever passes through a slot in a link that is worked by a common eccentric, the link being capable of being adjusted by means of a screw.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in sewing machines.* (A communication.) Application dated September 14, 1853. (No. 2131.)

The main feature of this invention consists in the employment of a number of hooked needles, similar to crochet hooks, which are fitted side by side in a sliding needle carrier, and at distances apart, to correspond with the length of stitch to be made.

WHITE, CHARLES, of Pimlico, Middlesex, paper-stainer. *Improvements in blocks for block printing.* Application dated September 15, 1853. (No. 2140.)

This invention mainly consists in forming the blocks used in printing the bordering of paper-hangings in separate pieces.

PROVISIONAL PROTECTIONS.

Dated December 17, 1853.

2945. James Septimus Cockings, of Birmingham, Warwick. Improvements in buttons and other dress-fastenings, part of which is also applicable for other purposes.

Dated December 21, 1853.

2971. John Jones, of Glasgow, Lanark, engineer. Improvements in propelling vessels.

Dated January 16, 1854.

102. George Fergusson Wilson, of Belmont, Vauxhall, managing director of Price's Patent Candle Company. Improvements in treating castor-oil, and obtaining products therefrom.

Dated January 18, 1854.

123. Robert Galloway, of Lambeth, Surrey, engineer. An improvement in admitting air to furnaces where tubular boilers are employed.

Dated January 19, 1854.

127. Joel Spiller, of Battersea, Surrey, engineer. Improvements in measuring and mixing, crushing, grinding, and pulverizing wheat and other substances.

Dated February 20, 1854.

399. René Charles Jules Prevet, of Paris, France, gentleman. Improvements in treating textile plants for obtaining pulp for manufacturing paper.

Dated February 24, 1854.

449. Benjamin Joseph Green, of Birmingham, Warwick, corrugated leather and other elastic manufacturer. Improvements in the manufacture of corrugated elastic materials.

Dated February 27, 1854.

470. Emile Chappuis, of St. Mary Axe, London. Improved apparatus for the diffusion of light, called "Illuminators."

Dated February 28, 1854.

483. William Simpson, of Tovil Upper Mills, near Maidstone, Kent. An improvement in employing in the manufacture of soap a product obtained when manufacturing pulp from straw.

Dated March 4, 1854.

525. Ellis Rowland, of Manchester, Lancaster, engineer. Certain improvements in machinery or apparatus for manufacturing bricks or tiles from clay or other plastic materials.

529. Felix Abate, of George-street, Hampstead-road, architect and civil engineer. Improvements in printing on and ornamenting surfaces.

531. Francis Herbert Wenham, of Effra Vale Lodge, Brixton, Surrey. An improved hydraulic machine for registering or indicating the flow or quantity of fluids, and obtaining motive power.

Dated March 6, 1854.

535. James Galloway, of Bolton-le-Moors, Lancaster, brass-founder. Improvements in the construction of cocks, taps, and valves.

537. Samuel Austin Chapin, of Trafalgar-square, Westminster, Middlesex. An improved mode of purifying smoke produced by the combustion of coal or other substances, and for condensing and collecting the solid and other matters contained in smoke and vapour arising from the combustion, smelting, burning, or roasting of fuel and other substances. A communication.

539. John Ronald, of Patrick Bank, near Paisley, printer and manufacturer. Improvements in printing yarns and threads.

541. John Richard Morton, of Oxford-street, Middlesex. Improvements in shades and reflectors applicable to certain descriptions of lamps, lanterns, or chandeliers.

Dated March 7, 1854.

545. Frederick Rixon, of Cockspur-street, Westminster, glass-manufacturer. Improved apparatus for lowering and disengaging ships' boats.

Dated March 8, 1854.

547. Thomas Dunn, of the Windsor Bridge Ironworks, Pendleton, Lancaster, engineer. Improvements in machinery and apparatus for moving engines and carriages from one line of rails to another, and for turning them.

551. Richard Boyell, of Derby-road, Nottingham, plumber. A portable safety-guard for the prevention of fire, applicable alike both to public and private buildings, and which said portable safety-guard is also applicable as a reviver.

555. William Septimus Losh, of Wreay Syke, Cumberland, gentleman. Certain means of decoloring resins.

557. John Aitken, of Longsight, near Manchester, Lancaster, gentleman. Improvements in obtaining motive power.

559. Joseph Brown, of Leadenhall-street, London, upholsterer and cabinet-maker. An improved method of swinging furniture and other articles for travelling by sea or land, and other purposes.

Dated March 9, 1854.

561. William Walter Good, of Moorgate-street, London, gentleman. Improvements in machines applicable for thrashing and winnowing.

563. George Thomas Selby, of Smethwick, Warwick, gentleman. Improvements in machinery for the manufacture of tubes and pipes, and for shaping tubular and circular metal articles.

564. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in machinery or apparatus for finishing fabrics. A communication from Desiré Prosper Pépin and Adolphe Roy.

565. William Beckett Johnson, of Manchester, Lancaster, engineer. Improvements in strengthening the ends of tubes to be attached to boiler-plates, or to be used for other such purposes.

566. Peter Armand Lecomte de Fontainemoreau, of South-street, Finsbury, London. An improved reaping-machine. A communication.

567. William Young, of Queen-street, Cheapside, London. Improvements in lamps.

568. John Holley Swan, of Glasgow, Lanark, Scotland, commission-merchant. Improvements in the tuyeres of blast and other furnaces and fires.

569. François Eugène Sulpice Garnier, of Paris, France. Improvements in machinery for preparing flax and other textile materials.

570. Hippolyte Lamy, of Paris, France. Certain improvements in preserving animal and vegetable substances.

Dated March 10, 1854.

572. Emile Alfred Desrousseaux, of Roubaix, France, architect. Improvements in looms for weaving.

573. William Peace, of Haigh, near Wigan, Lancaster, mining-engineer. Improvements in machinery for measuring, indicating, and registering the flow of air, gas, and other liquids, and for governing the speed of steam or other engines.

574. Simeon Mosely, of Hull, York, surgeon-dentist. Improvements in the manufacture of artificial palates for the adaptation of artificial teeth.

575. James Lawrence, of Leeds, York. An improved rotatory engine.

576. Peter Armand Lecomte de Fontainemoreau, of South-street, Finsbury, London. Improvements in the manufacture of candles. A communication.

577. John Buchanan, of Leamington Priors, Warwick, gentleman. An improvement in communicating motion to or from the ordinary crank or an eccentric.

578. William Day, of Beverley, York. Improvements in the construction of covered carts and other like vehicles, which may be used as dwelling places or travelling houses.

579. Francis Whitehead, draughtsman, and William Whitehead, mechanician, of Crayford, Kent. Improvements in raising, forcing, and supplying water and other liquids.

580. William Mill, of Hunter's-lane, Birmingham. Improvements in inkstands or ink-holders.

581. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in the manufacture of raised printing surfaces. A communication.

582. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in the mode of purifying coal-gas, and of obtaining during the manufacture of the gas a certain purifying material, and in apparatus to be used in purifying gas. A communication.

583. Désiré Parfait Lefèvre, of Paris, France. An improved railway brake.

584. Zephirin Boitteux, of Epinal, France. Certain improvements in the machinery for sculpturing and carving.

586. John Patterson, of Beverley, York, engineer. Improvements in machines for washing cloth and similar materials.

587. John Henry Johnson, of Lincoln's-inn fields, Middlesex, gentleman. Improvements in the manufacture of hollow jewellery. A communication from Jean Medard Payen.

Dated March 11, 1854.

590. Willoughby Theobald Monzani, of St. James's-terrace, Bermondsey, Surrey, gentleman. Improvements in bedsteads and packing-cases or boxes to contain the same and other articles.

592. William Tytherleigh, of Birmingham, Warwick, hollow-ware manufacturer. Improvements in the manufacture of tea-kettles.

596. James Sparrow, junior, of Tettenhall-road, Wolverhampton, Stafford. Improvements in shears for cutting iron or other metals.

Dated March 14, 1854.

610. Albert Wentworth Conner, engineer, of Crooked-lane, Cannon-street, London. Improvements in the apparatus used for moulding bricks and lumps.

612. Johnson Hands, of Epsom, Surrey. Improvements in kilns.

Dated March 15, 1854.

614. Richard Archibald Brooman, of 166, Fleet-

street, London, patent-agent. Improvements in sector-presses. A communication.

618. Thomas Stephen Holt and Charles Herbert Holt, of Manchester, Lancaster, engineers. Improvements in steam boilers.

620. Laurence Whitaker, of Haslingden, Lancaster, cotton-spinner, and Greenwood Lyons, of the same place, manager. Certain improvements in grinding or setting the main cylinder of carding engines used for carding cotton and other fibrous materials.

622. Alfred Trueman, of Swansea, Glamorgan. An improved furnace for the calcination of copper ores and other mineral substances.

624. Antoine Edouard Paschal Le Gros, of Paris, France. Improvements in preserving timber, and generally all kinds of wood.

626. George Pead and Cornelius Wyatt, both of Conduit-street, Regent-street, Middlesex. An instrument for readily ascertaining the wear of the bearings of railway carriages.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March 28th, 1854.*)

2410. William Roy, senior. Improvements in printing textile fabrics and other surfaces.

2516. John Brown. Improvements in the construction of wagons.

2522. Samuel Lomas. Improvements in machinery for spinning and doubling silk.

2566. Henry Pratt. Improvements in kneading dough, and which said improvements are also applicable to the kneading or beating of clay, loam, or other plastic materials.

2574. Robert William Jearrad. Improvements in steam boiler and other furnaces.

2656. David Pratt. Certain mechanical arrangements for raising thimbles, the same to be worked by steam, water, or other power, thereby superseding hand-labour.

2676. Thomas Holmes. Improvements in ventilating drying-stoves.

2707. Edward Briggs. Improvements in weaving and manufacturing raised pile fabrics, and in machinery employed therein.

2720. Henry Robert Abraham. Improvements in coffins and in hearses, and improvements in receptacles for coffins for their transmission.

2754. Emmanuel Barthélemy, Tony Petitjean, and Jean Pierre Bourquin. Improved means of ornamenting glass.

2768. Prix Charles Jean Baptiste Sochet. Improvements in obtaining motive power by means of heated gases.

2788. John Patterson. Improvements in land-rollers or clod-crushers.

2802. Auguste Edouard Loradoux Bellford. Improvements in blocks for ships and other uses. A communication.

2824. John Patterson. Improvements in reaping-machines.

2889. George Kerr Hannah. The combination and manufacture of composition grinding-wheels, hones, and other grinding bodies.

2899. John Zuill Kay. Improvements in gas-meters.

2909. Jacques Pierre Henri Vivien. Certain improvements in the manufacture of paper and paste-board.

2910. Auguste Edouard Loradoux Bellford. An improvement in blasting powder for mining, and other operations of a similar nature. (A communication.)

2934. Andrew Lawson Knox. Improvements in ornamenting certain descriptions of textile fabrics.

2951. Auguste Edouard Loradoux Bellford. Certain improvements in presses for expressing oil or other fluids from fruits, grains, or other substances. A communication.

3010. Francis Parker. An improvement in the manufacture of gaiters.

33. John Healey. Improvements in spinning-machines known as mules, and in machines of similar character. A communication from Adolphe Peynaud and Edmond Peynaud, manufacturers of Charleval, France.

102. George Fergusson Wilson. Improvements in treating castor-oil, and obtaining products therefrom.

338. John Getty. An improved mode of plating iron vessels.

387. Ellis Rowland and James Rowland. Improvements in cleaning the tubular flues of steam boilers.

396. Nicholas Riggenbach. Apparatus for preventing incrustration in steam boilers.

397. William Henry Barlow. Improvements in securing and connecting the rails of railways.

468. William Edwards Staite. Improvements in the treatment and preparation of madder and munjeet for dyeing and printing.

483. William Simpson. An improvement in employing in the manufacture of soap a product obtained when manufacturing pulp from straw.

486. William Patten. Improvements in valves and apparatus for supplying water.

489. John Thomas Way and John Manwaring Paine. Improvements in the manufacture of gas, and also of a charred product.

519. John Nicholson. Improvements in and applicable to certain descriptions of close kitchen-ranges.

522. Caleb Bloomer. Improvements in spikes and bolts.

523. Joseph Bour. Improvements in evaporating saccharine liquids.

529. Felix Abate. Improvements in printing on and ornamenting surfaces.

544. William Clay. An improved mode of manufacturing axles, shafting, and other like solid articles which present a round figure in cross section.

548. Henry Bernoulli Barlow. Improvements in waterproofing and finishing textile fabrics and yarns. A communication.

571. Sanders Trotman. An improved alarum-night-clock or time-indicator.

580. William Mill. Improvements in inkstands or inkholders.

590. Willoughby Theobald Monzani. Improvements in bedsteads, and packing-cases or boxes to contain the same and other articles.

614. Richard Archibald Brooman. Improvements in sector presses. A communication.

622. Alfred Trueman. An improved furnace for the calcination of copper ores and other mineral substances.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed March 23, 1854.

2198. Charles Alexander.
2200. Robert Varvill.

Sealed March 25, 1854.

2210. Joseph Ellisdon.

2213. Francis Frederick Clossmann.
2217. Isaac Bury and William Green.
2248. Samuel Murland.
2280. William Littell Tizard.
2281. John Milner.
2320. Richard Archibald Brooman.
2418. Alexis Dussac.
2463. Alfred Vincent Newton.
2473. Edward Joseph Hughes.
2494. Richard Archibald Brooman.
2564. William Edward Newton.
2570. John Banks Nicklin.
2839. Alfred Vincent Newton.
3009. John Barnes.
3019. James William Crossley.

1854.

47. Richard Albert Tilghman.
58. Alexander Mitchell.
120. William Thomas.
155. Charles John Edwards.
160. Thomas Robinson.
182. Samuel Cunliffe Lister.
227. John Kershaw.
265. John Hamilton Glassford.

Sealed March 29, 1854.

2231. François Julien Raux.
2237. John Henry Johnson.
2277. Samuel Leake Worth and Agmond Dishin Vesey Canavan.
2309. William Potts.
2366. Andrew McLean and William Fraser Rae.
2380. Auguste Edouard Loradoux Bellford.
2404. Emory Rider.
2408. John Wright Child and Robert Wilson.
2457. Jean Baptiste Verdun.
2527. Henry Tylor.
2771. John Carter Ramsden.

1854.

8. Henry Lee Corlett.
150. Cyprien Marie Tessie du Motay.
198. Thomas Wicksteed.
215. Donald Bethune.
245. James Jackson and George Morris Hantler.
302. James Taylor, Isaac Brown, and John Brown.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Proprietor's Names.	Addresses.	Subject of Design.
Feb. 16	3564	S. Plummer	Holloway	Hassock.
17	3565	J. Wilcox	Kingston upon-Hull	Lanthorn.
18	3566	T. Geoghegan	Jermyn-street	Raglan surtout.
20	3567	M. Fagan	Sheffield	Linen-marker.
21	3568	Gay and Son	High Holborn	Brush-guard.
23	3569	Fawcet and Butterworth	Manchester	Coin-detector.
24	3570	F. S. Archer	Great Russell-street	Folding camera.
25	3571	W. Fuller	Jermyn-street	Ice-pail.
27	3572	W. Streeton	Hackney-road	Garden engine.
March 2	3573	J. Allday	Birmingham	Letter-clip.
4	3574	Nicoll, Haynes, and Simes	Regent-street	Mantle.
10	3575	J. Hill	Piccadilly	Camp-bedstead.
,,	3576	T. Jenner	Lewes	Drainage-plough
18	3577	H. Distin	Leicester-square	Cornet-à-piston.
21	3578	W. Hart	Norwich	Lady's shoe.
25	3579	W. Wahler and P. Hooker	Old-street	Levigator.
28	3580	T J. Hale	Bristol	Beer-engine.
29	3581	G. Marriott	Bermondsey	Fire-lighter.
,,	3582	Deane, Dray, & Deane.	London Bridge	Tilt-rest for beer-barrels.

LIST OF PROVISIONAL REGISTRATIONS.

Feb. 23	562	S. Norris	Horseferry-road	Bill-file.
24	563	J. Killmister	Portland-road	Harness.
March 2	564	J. C. Reccordon	Braintree	Quintsector.
3	565	A. Hely	Cannon-row	Watch-box.
4	566	M. Hyams and Co.	Smithfield	Cigar-case.
9	567	W. Hart	Norwich	Lady's-shoe.
11	568	C. Rowley	Birmingham	Stair-rod.
16	569	M. Townsend	Lambeth	Bonnet.
20	570	H. Distin	Leicester-square	Clarionet.
24	571	Hardy and Jolly	Westbourne Grove	Stamp.
25	572	B. Fowler and H. Minton	Liverpool	Level-indicator.
,,	573	Ditto ditto	Ditto	Level rule.
28	574	G. Kane	Dublin	Portmanteau.

NOTICES TO CORRESPONDENTS.

T. N, Norwich.—Zoologists have generally considered *spongia* organizations to belong to the animal kingdom, and have ranked them among zoophyta; but many eminent writers dissent from this view on various grounds, and class the marine and fresh-water sponges with plants.

J. Staunton.—In etching by galvanism, the plate to be bitten in has the device first drawn upon the same ground as that used in the ordinary etching process; after this is done, the back and edges of the plate are coated with wax, and it is then connected, by means of a wire, with the silver plate of one or two Smee's batteries.

T. Grundy.—Mr. Babbage's Paper on the Principles of Tools for Turning and Planing Metals, read before the Royal Society, is reprinted in the 2nd Volume of Holtzapffel's "Turning and Mechanical Manipulation."

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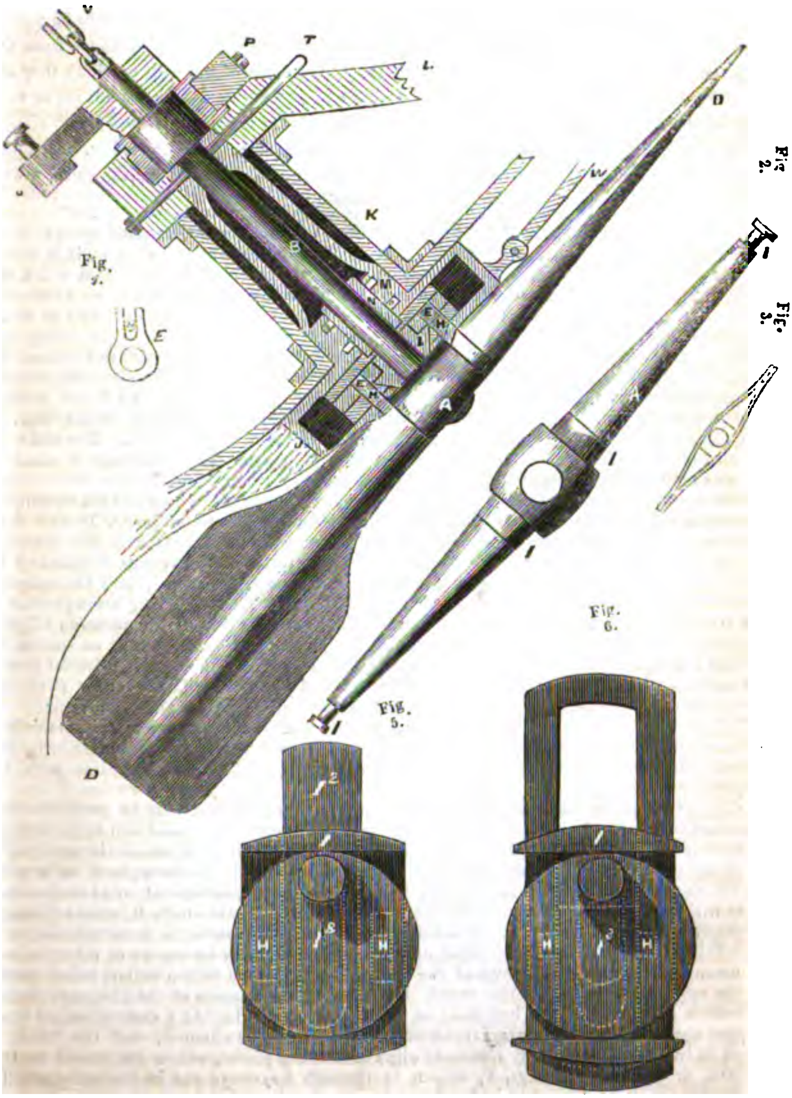
WILDING'S PATENT SUBMERGED PROPELLER.

Fig. 1.



WILDING'S PATENT SUBMERGED PROPELLER.

(Patent dated October 3, 1853.)

Mr. W. H. Wilding, of Chesterfield-street, London, has invented and patented a submerged propeller, with which he has performed several very satisfactory experiments, obtaining a speed unusually great for the engine power employed. In his propeller two blades or floats are mounted on a shaft, these blades being feathered by means of an elliptical chuck, so that while one float is propelling, the other moves through the water edgeways, with a resistance due to friction only. One or more of these propellers is to be placed on each side of the ship, at any suitable height, and at any convenient distance from the stem or stern, the position being suited to the particular form of the ship to which they are fitted; the only condition being that the propellers must be placed so as to act in, or very nearly in, the direction of the vessel's motion. The inventor has also planned a very simple method of shipping and unshipping the propeller, so that it may be hoisted on board the ship without the necessity of forming, at the expense of strength and convenience, a well through the vessel, as in the case of the screw propeller.

The engravings on the preceding page represent a propeller constructed according to Mr. Wilding's invention. A, figs. 1 and 2, is the shaft or rod on which the floats, DD, work, the floats being placed in such relative positions that the planes of their greatest width are at right angles to each other, or nearly so; B is the main or driving shaft, to which the shaft or bar, A, is fixed by a boss in its centre. The floats are formed of two or more plates of metal, strongly united together, as shown in section in fig. 3, a space being left between them to receive the bar, A, and they are furnished with brasses, to work on the journals, 1 1, on the shaft or rod, A; or the floats may be formed in a single casting, having a bearing throughout their length, to work on the rod, A. E E, figs. 1 and 4, are slotted cranks or snugs, fixed on or cast with the floats, and working on pins, H H, in the slide, I, of the elliptical chuck, by which the feathering of the blades is effected. The slide, I, works on the dovetailed piece, I^2, fixed to and revolving with the main shaft, B; and it also works against the eccentric, I^3, which is fixed within the casing, J, the back of the slide being provided with parallel guides, moving in contact with the edges of the eccentric, and by this means obtaining its sliding movement on the dovetailed piece, I^2, and thus feathering the blades as the shaft, B, revolves. The whole of these parts are enclosed within the casing, J, sunk in the side or other convenient part of the vessel, or attached to the interior trunk, M, of the unshipping apparatus hereinafter described, and the exterior of the casing, or a portion of it, rotates with the propeller. The feathering arrangement is shown separately in fig. 5, and its construction is the same as that of the common elliptic chuck used with the turning lathe, a portion of the slide, I, being cut away, as shown by the dotted lines in fig. 5, to allow of the main shaft, B, passing through it, without interfering with its free action, or traverse on the dovetailed piece, I^2. The inventor does not, however, confine himself to this particular arrangement of elliptical chuck movement, as any of the ordinary forms will answer equally well. Fig. 6 shows one of the variations which may be adopted, in which the fixed and moveable parts, before described, are reversed, the pins, H H, being placed below the slide, instead of in a line with its thickness.

The means by which the shipping and unshipping of the propeller may be performed are represented in fig. 1. K is a strong trunk or passage bolted to the vessel and to the bed or foundation-plate, L, of the engine. M is an interior trunk or plug, which is accurately fitted to the trunk, K, at its lower end, and for a sufficient distance throughout its length, to ensure steadiness, the contact surfaces being made square, octagonal, or of such other form as will prevent the turning of the interior trunk. The main shaft, B, passes through the interior trunk, and works at its lower extremity in the brasses, N, fitted therein; the brasses being capable of being tightened up by the keys, O O, or by screws or other convenient means. The upper extremity of the shaft, B, is furnished with a collar, which works upon the upper end of the interior trunk, and also in the brasses of the plummer block, P, which is mounted in the bed-plate of the engine in fig. 1. At a short distance from the upper extremity of the interior trunk is turned a groove or channel, and the trunk is retained in its position either by means of clips or holding pieces, which are bolted to the bed-plate, or by means of keys, T, driven in through key-ways cut in the bed-plate, L. The interior trunk is thus firmly fixed in the trunk, K, while the propeller is shipped.

When it is required to unship the propeller, the crank, U of the engine must be removed from the end of the main shaft, B, and the rope or chain, V, connected to the upper end of that shaft; the clips or keys are then withdrawn and the interior trunk, M, is free to pass out of the main trunk, K, carrying with it the propeller and driving shaft, &c., which are hoisted on deck over the ship's side by the second rope or chain, W, which is attached to the outer part of the trunk, K, the rope, V, being gradually let out as the propeller, &c., is drawn up. To ship the propeller, these operations are reversed. When the propeller is removed, the trunk is to be plugged or stopped in any convenient manner, to prevent the entrance of water through it.

In order to prevent injury to the propellers in coming alongside a wharf or quay, the inventor recommends that the vessels to which they are fitted should be furnished with guards or fenders, projecting from the sides to a sufficient distance, to protect the propellers from abrasion or shocks.

A NEW SYSTEM OF SEA-COAST AND OTHER LIGHTS.

Notwithstanding the general horror that is entertained of shipwreck by all classes, it is highly probable that a large amount of ignorance exists concerning its extent and causes. There are doubtless but few persons who would not be startled at the astonishing intelligence, that during the last four years 204 ships and their crews departed from our coasts, not one of which was ever heard of again. Nor are there many who would not be equally surprised to find, that within the four years alluded to, there happened at sea 12,363 disasters, varying in magnitude from a total shipwreck to a slight collision. We at present propose to treat of one source which gives rise to many of these disasters, and to lay before our readers a method by which the recurrence of similar events from the same cause may be avoided.

The lights along a coast, of course, require to be characterised by apparent and striking distinctions, so that they may be readily known by an approaching or passing vessel, in order that its course may be suitably shaped. With this object the catoptric and dioptric systems of lights for lighthouses have been subjected to certain mechanical modifications, by means of which they are caused to present various appearances, according to which they are named; hence we have fixed, revolving, flashing, intermittent, double fixed, and double revolving lights; and others in which different colours are employed in combination with the mechanical arrangements which produce these variations. But experience is continually teaching us, that these distinctions are insufficient to guard the mariner from the disastrous consequences of taking one light for another. We will cite a few instances of accidents occurring at different parts of the world in proof of this.

In 1842 the *Reliance* was standing up the English Channel in thick weather, under shortened sail, and with the lead continually going, when one of the crew, who had the forecastle watch, reported that he saw lights, which were shortly afterwards observed on both the port and starboard sides by several others. The second mate, who was on duty at the time, said that those on the weather bow were ships' lights; and added, "Hurrah, boys, the light on the lee beam is Dungeness! We shall be in the Downs this morning." Very soon after, the ship struck and went to pieces on the French coast, nearly all hands on board perishing.

Shortly after the loss of Her Majesty's Troop-ship *Birkenhead*, Captain Parish, of the passenger-ship *Wellesley*, addressed a letter to the *Englishman*, stating, that on his outward passage, when passing Cape L'Agulhas he saw a bright light on shore, exactly resembling L'Agulhas light, and not far from where the *Birkenhead* was lost. It appears that false lights are very common on this coast, and Captain Parish is inclined to attribute the loss of the *Birkenhead* to this circumstance.

On the 15th of August, 1851, the brig *Greeman*, of and for Liverpool, from Kingston, Jamaica, with a cargo of logwood and coffee, ran ashore on Bocco Grande Bar, having mistaken the new lighthouse on Sand Key for Double-headed Shot Keys light.

In February, of the present year, the *Yorkshireman*, a new paddle-steamer, left Morecombe for Belfast, with a general cargo, and was totally lost, in consequence of having, during a snow-storm, taken Donaghadee Pier-light for the Copeland light.

On the 27th of the same month, the *Edinburgh* steamer struck upon the Barkum-riff, on the coast of East Friesland, during a gale from the north-west, in consequence of having taken Barkum Island light for that of Heligoland.

We might greatly increase the number of these examples, but these are sufficient to show the pressing necessity that exists for such improvements in existing light-

houses as shall render such lamentable events impossible.

We are thus led to the novel lighthouse system, to which we have already alluded. It consists of a plan for distinguishing sea-coast and other lights by occultations, and is the invention of Charles Babbage, Esq., the author, as our readers are aware, of the Difference and Analytical Engines, two of the most astonishing inventions that any age has produced. We shall take our description of this system from a paper sent by the author in reply to an application made to him on the part of the Lighthouse Board of the United States, who "received it with much gratification," and resolved "to use every endeavour to have a full trial made of the method, which, in their opinion, promises such great advantages to the navigation of the world."

The object of the paper is to point out certain improvements in the use of existing lighthouses, by which it shall become almost impossible—

1st. To mistake any casual light on shore or at sea for a lighthouse.

2nd. Ever to mistake one lighthouse for another.

The plan requires, in most instances, no change in the optical means at present used for condensing and directing the illumination of lighthouses; it adds slightly to the facility of observing them at great distances, and from its simplicity and generality is equally adapted to the use of all countries. Revolving lights must become fixed; but the mechanism already existing for their rotation may, with little alteration, be employed for the motions required by the new system.

The principle by which these objects are to be accomplished, is to—

Make each lighthouse repeat its own number continually during the whole time it is lighted.

This is accomplished by enclosing the upper part of the glass cylinder of the Argand burner by a thin tube of tin or brass, which, when made to descend slowly before the flame, and then allowed suddenly to start back, will cause an occultation and reappearance of the light.

The number belonging to the lighthouse may be thus indicated to distant vessels. Take as an example 243.

1. Let there be two occulations.
2. A short pause.
3. Four occultations.
4. A short pause.
5. Three occultations.
6. A longer interval of time.

This system of occultations must be repeated all night by proper mechanism.

The rapidity of the occultations themselves, the length of the pauses between the units and the tens, and between the tens and the hundreds, as well as the duration of the long interval of time which marks the termination of the number, must be made the subject of experiment.

A light has been already used as an illustration, in which the occultations occurred at intervals of one second; the pause occupied four, and the long interval ten seconds. The pause was thought to be unnecessarily long, and was diminished. Whatever may be the times ultimately adopted, the experiments already made render it improbable that the average time required by a lighthouse for repeating its number should amount to one minute.

It is by no means necessary that the counting of the number of a lighthouse should commence with the digit which expresses hundreds. No greater amount of time would have elapsed, if, in the above instance, the observer had commenced with counting the unit's figure. It would then have read thus:

(3 occultations,) long interval, (2 occultations,) pause, (4 occultations,) pause.

But, since the long interval denotes the commencement of a number, it is already apparent that the number of the lighthouse is 243, and not 324.

In order still further to prevent mistakes arising from an accidental error in counting the number of occultations, it will be convenient to establish another principle for the purpose of numbering the lighthouses.

Lighthouses must not be numbered in the order of their position; but every lighthouse must have such a number assigned to it that no digit occurring in the number denoting the several lighthouses nearest to it on either side shall have the same digit in the same place of figures.

If five adjacent lighthouses were thus numbered: 361, 517, 243, 876, and 182, supposing a mistake to have occurred in the first time of counting 243, and that it had been reported to the master of the vessel as 253, he would immediately, on looking at his numerical list of lighthouses, perceive that a mistake had been made in the middle figure, because in any general arrangement, the number 253 would have been assigned to some lighthouse on a coast very distant from that on which 243 was placed. In fact, two out of any three figures would always detect the error of the third.

The law of numbering just stated is sufficient for the present object. Probably a little inquiry might produce a still better arrangement.

Thus occultations would distinguish every lighthouse from all casual lights, and their number would identify the light itself. The

whole illuminating power would be always employed, undiminished by the interposition of coloured glass. These lights would be more easily visible at a distance, because it is known that the eye perceives more readily a faint light which is intermittent than an equal light which is continuous.

OF HARBOUR LIGHTS.

The same principle of numerical lights is equally applicable to lighthouses which indicate harbours. Information, however, of another kind is often requisite for vessels about to enter them. It is always desirable that the depth of water, either within the harbour or on the bar, should be known.

This may be effected most simply by allowing the occultations of white light to indicate the number of the lighthouse, and instead of having a *long interval* of white light between each repetition, let a coloured glass be placed before the light, and a number of occultations be made, equal to the number of feet of water existing at the time.

Thus a tidal-harbour lighthouse will continually repeat its own proper number in white light, followed by the number of feet of water on the bar in coloured light. If it should be thought desirable, it would be easy to make the colour of the light *blue* when the tide is rising, and green when it is falling.

The mechanism for harbour lights need not be complicated, and by means of a float might be made entirely self-acting. The weight necessary for making the occultations might even be wound up by the float itself.

Another great advantage of a float is, that the depth of water indicated will always be the real depth at the time. The computed depth often differs from the true depth, owing to the influence of storms, and other accidental causes.

Some additions to this mechanism would enable it to indicate the depth of water on the bar by day as well as by night.

OF FOG SIGNALS.

During the prevalence of fogs, the lights which ought to guide the seamen are often indistinctly seen, or entirely obscured, until he has approached too near the danger against which they were intended to warn him.

In cases of fog, light-ships and lighthouses are in some instances provided with gongs and bells, which are then kept constantly sounding. It is unfortunate that the means of warning the seaman of his danger should extend to the shortest distance when that danger is most imminent. The lights usually employed are visible at a distance of from six to thirty miles; but the sound of a gong or bell is heard at a comparatively very small distance.

When these instruments are heard, they merely indicate danger; but not its exact nature. It might, in some cases, be of great importance that the gong or bell should indicate the number of the light-ship. This could be accomplished by a very trifling alteration in the mechanism. Instead of striking the instrument at fixed intervals, let there be pauses and a long interval between the number of strokes which successively represent the digits of the number of the light ship, just in the same manner as has been proposed for lighthouses.

A lighthouse or light-ship, whose number is 243, would be thus indicated during fogs:

(2 blows on gong,) pause, (4 blows on gong,) pause, (3 blows on gong,) long interval.

The same mechanism which caused the occultations of the light, might produce the blows on the gong.

The preceding explanations are sufficient to show that each lighthouse or light-ship, by continually repeating its *own number*, might render any mistake of it for a different light very nearly impossible. The great principle on which the system rests, is *to give numerical expression to each light*. If it be not thought necessary to apply it to every lighthouse, the most important may be chosen for its application. The expense of the alteration, and the amount of danger incurred by a mistake, will furnish the ground of decision in each individual case.

In proposing, however, a new system, which has extensive bearings on other questions connected with the safety of those who travel on the waters, it is desirable that a general and comprehensive view should be taken of such of its applications as the rapid advance in mechanical and chemical science justify us in supposing must take place in a few years.

However partially the system may be adopted at first, a judicious foresight into its probable applications may enable us, without any present inconvenience, to accelerate future improvements, and to save considerable expense on their adoption.

The following suggestions for improvements or applications, many of which are perfectly practicable at the present time, are offered for the consideration of those who may be called upon to carry out the *Numerical System of Lighthouses*. They are not necessary for the success of the simple plan which has been already described, but may be adopted or rejected without any interference with it.

SUGGESTIONS FOR THE IMPROVEMENT OF LIGHTHOUSE SIGNALS, BUOYS, ETC.

Telegraphic communications during the night between lighthouses and ships in distress.

Cases occur in which it is of great consequence that a ship should communicate with the land long before it can send a boat ashore, or enter its intended port. It may be the bearer of important intelligence. It may convey some personage whose presence is essential for some great object. The vessel itself may be in distress. The state of the elements may render it impossible to send for, or receive any assistance from the land; yet, even under such unfavourable circumstances, if directions from skilful pilots acquainted with the coast could be conveyed to the ship, its wreck might, perhaps, be prevented; or, if driven on shore, having been directed to the least unfavourable spot, its crew might possibly be saved.

Such communications might easily be organised. There are already existing in the Royal Navy, in the East India Company's service, and elsewhere, large dictionaries of numerical signals. These, it is true, are made by flags, or by balls; but the same numbers may be expressed by the occultations of lamps. Any number, however large, may be expressed by making the number of occultations corresponding to the first or highest digit, then allowing a pause; after which the number of occultations representing the second digit, then a pause; and so on, always observing that, after the unit's figure has been expressed, there must follow a long interval.

The plan for telegraphic communication would be thus arranged:

1. Lighthouse repeating its own number.
2. Ship fires a gun and hoists a light, to call the attention of the light-keeper.
3. Lighthouse ceases repeating its number, and becomes a steady light, thus informing the ship that it is observed.
4. Ship having prepared its message, numerically expresses it by the occultations of its own lamp.
5. Lighthouse repeats the message of ship, in order to show that it has been rightly understood.
6. Lighthouse now repeats its *own number*, whilst it is preparing the answer.
7. Lighthouse expresses its answer by occultations.
8. Ship repeats the answer.

This interchange of question and answer is continued as long as necessary, during which the lighthouse repeats its own number previously to each reply.

Very little delay will occur; for these questions and answers will be arranged on moveable discs, which may be placed in the mechanism employed for occulting, even whilst it is repeating another message. Many such discs, each containing a different message, may be placed in the machine at once, and on touching any lever the light will continue repeating the corresponding message.

In case of a ship in distress, for instance, requiring an anchor of given weight, it may be necessary to send to the habour-master of the adjacent port to give the order, and to ascertain the time when it can reach the vessel. During this interval the lighthouse will be repeating its own number.

An electric telegraph from the lighthouse to the dwelling of the harbour-master would save much time, and in some cases much damage.

The gun fired by the vessel might also be heard by the harbour-master, and his attention then being directed to the telegraph lighthouse, the whole time might be saved. If even his own house was invisible to the ship, but within view of the lighthouse, he might by means of a small light, correspond with the ship through the intervention of the lighthouse, repeating the signals of both parties.

Coloured shades might, if thought expedient, be used for different dictionaries; or an entirely independent lantern might be specially devoted to signals; but this would cause additional expense, and seems unnecessary.

It may be objected to this plan, that it would mislead other vessels on first coming in sight of the lighthouse. This objection, however, will be found on examination to be invalid; for a ship on first getting sight of a lighthouse, will be at the distance of many miles; and as all telegraphic messages would consist of more than three places of figures, the ship would immediately perceive that the lighthouse was acting telegraphically, and, on turning to the dictionary, would even become acquainted with its message. Besides, in the course of every three minutes, at least, the lighthouse would repeat its own number. Thus the ship would always know that it was in the presence of a lighthouse; and if its reckoning did not enable it to identify the light, it could only remain in doubt during a few minutes.

(*To be continued.*)

RUTHVEN'S PROPELLER.

At the discussion on D. K. Clark's paper, "On Ruthven's Propeller," at the Institution of Civil Engineers, it was contended, that there was no novelty in the system of propulsion proposed by Messrs. Ruthven. Benjamin Franklin was amongst

the first to notice it; he related, that as a boy, whilst bathing in a pool, into which a wooden pump had been thrown, to swell the timber, he got astride upon it, and commenced pumping; to his astonishment he found that he was propelling himself across the water; subsequently he investigated the circumstances, and admitted the inefficient application of power. Sir Isambard Brunel attempted propulsion by means of a tube, in which there was a diaphragm, pushing the water before it, and acting upon a very light valve on the return stroke; this was only an elongated paddle-wheel with an intermittent and inefficient action.

Mr. Bidder tried the system also on board a canal-boat; and although quite aware of the loss of power incidental to it, he expected a compensation from the advantageous application of steam, as opposed to animal power.

As to this particular case of Ruthven's and other similar propellers, it was argued, that the reasoning in the paper was as totally at variance with the actual results of the experiments as with the received laws of hydraulics.

To show this, it sufficed to state, that according to the paper the useful effect realised was 64 per cent. of the power of the engine, stated at 40 horse-power (indicated), which would give 25½ horse-power useful effect; but it was stated, in the experiments, that the two nozzles were 10 inches diameter each = together $1\frac{1}{12}$ square foot area. The head of water was $8\frac{6}{10}$ feet = to a pressure of nearly 540 lbs. per foot, or to a total pressure of about 580 lbs., which represented also the resistance of the vessel at 9½ miles per hour, giving, therefore, a useful effect of 14¾ horse-power, instead of 25½ horse-power, as stated in the paper.

It was an error to state that the maximum of useful effect was when the velocity of the issuing water was equal to that of the vessel, or when the water dropped vertically from the nozzles; it could be shown, that in that particular condition there was not any development of useful effect. The actual operation of the system of propulsion was then shown to be analogous to the assumed case of a closed vessel of any shape, filled with a fluid of given density, and under a given pressure; it was evident, that so long as the vessel remained in that normal state, no propulsive force would be exerted in any direction, the whole being *in equilibrio;* but on an aperture being made in either of the sides of the vessel, it was obvious, that the area of the opening, being relieved from pressure, the *equilibrium* would be disturbed, exactly by the extent of that aperture, into the head, and there would be a corresponding force exerted in the opposite direction.

To apply this to the case under consideration, a vessel must be imagined containing water under a pressure = to 3 feet, which was the head due to the velocity of the vessel in the experiment. By making an aperture of about 3½ feet area, there would be an unbalanced pressure of about 580 lbs., equivalent to that of the former statement; but the velocity of issue would be 14 feet per second, and the power used would be about 15 horse-power. But if the aperture was assumed to be reduced to $1\frac{1}{12}$ square foot = the area of the two nozzles, then it would require $8\frac{6}{10}$ths feet head to produce the same pressure. The velocity of issue would be 23 feet per second, and the power would be about 25 horse-power; thus the power required was exactly in the ratio of the velocity of issue, or inversely as the square root of the head. The loss was therefore 60 per cent. instead of 12 per cent., as stated in the paper.

But the fundamental error in the paper was the omission of the loss of power, arising from picking up the water in a state of rest, and communicating to it the velocity of the vessel. Supposing the water to be composed of an infinite number of globules, possessing weight, and being in a state of rest, they must all be raised to the head due to the velocity of the vessel, and then to the additional head requisite for propulsion.

In the present case, the quantity of water issuing from the nozzles was 25 feet per second; this required to be raised 3 feet, to be equivalent to the velocity of the vessel—demanding therefore the exertion of 9 horse-power. The results of the experiments would be more correctly stated thus:

	Horse-power.
Useful effect . . .	14¾
Power consumed in raising the water to the velocity of the vessel . . . =	9
Power used in propelling the water through the nozzles =	25
Total power expended, exclusive of the friction in the water-ways, and of the engine itself . . . =	34

The absence of indicator diagrams was regretted, as tending to throw a doubt on the results; but it was admitted that the boiler surface, and the actual consumption of fuel, bore out the statements of the paper.

It was contended, in reply, that, though

engine power was consumed in getting the water up to the speed of the vessel, it did not necessarily follow, that an equal amount of power was further required to expel the water. This single employment of power could be arrived at, by properly forming the water passages, so as to avoid all concussions of the water, by rectangular bends, or by sudden enlargements, or alterations of form; and the desired object was stated to be so to proportion the dimensions of the engine and the propeller, that the effluent speed of the water in one direction, would be equal to that of the vessel in the other. In this case, it was stated 100 per cent. of the engine power, minus fractional resistance, would be usefully available.

That, practically, there were situations in which such a propeller might be found very serviceable. For instance, in crowded rivers, where paddle-wheels were objectionable, amidst ice, and in shallow water, where the screw was not available, and in many other situations, where any great projections from the sides of the hull were undesirable.

As an example, it was stated that it would be very desirable for the purposes of the fire brigade, to have the means of bringing up the large floating-engine at all times of the tide and under all circumstances of ice of an incumbered stream or of shallow water, at a speed of ten miles an hour, propelled by its own engines. Experiments had already been made upon one of the floating engines, which although very imperfect, were sufficient to prove the adaptability of the system to the wants of the fire brigade.

In fine, it was contended, that although there still remained much to be done, to demonstrate the practical efficiency of so great an innovation, the experiments were sufficiently successful to induce further investigations, which the author was requested to continue and to report to the institution.

VENTILATED BOOTS, SHOES, AND GOLOSHES.

At page 170, Vol. LV., we published a description of an invention patented in 1851, by Mr. Marsden, of Kingsland-road, Shoreditch, which consisted in constructing boots and shoes so as to admit of a free circulation of air through them, in order to prevent that unpleasant and injurious overheating of the feet, which is experienced in wearing ordinary boots and shoes, especially when walking. The sanitary advantage derived from Mr. Marsden's improvements was such as elicited for them the cordial approbation of medical journals, while the comfort experienced by wearers had the effect of rapidly bringing the invention into general use.

Mr. Marsden has subsequently applied these improvements to goloshes and American over-shoes with the same success, and is about, we are informed, to open extensive premises in Gracechurch-street, City, for the purpose of meeting the large demands that are made for the application of his ventilating arrangement to every description of the existing stock of wholesale and retail dealers.

MR. HOBBS' LOCKS.

A splendid silver snuff-box has been presented to Mr. Goater, foreman of Mr. Chubbs' lock-making establishment, bearing the following inscription:—"This box was presented to Mr. John Goater, by the workmen employed at Wolverhampton by Messrs. Chubb and Son, for his great ingenuity in picking Hobbs' Patent Unpickable American Lock. Wolverhampton, February, 1854."

CAPTAIN CARPENTER'S SCREW-PROPELLER PATENT.

The Judicial Committee of the Privy Council, on Friday, March 31, granted an unconditional extension, for six years, of Captain Carpenter's Screw-propeller Patent.

UNIFORM WEIGHTS, MEASURES, AND COINS.

To the Editor of the Mechanics' Magazine.

Sir,—The importance to a commercial country, like ours, of a uniform scale of value, &c., it is not possible to over-rate. The whole enlightened portion of the community are upon this point, and have long been, most entirely agreed. Any difference that exists, arises only when they come to consider what are the most proper means for arriving at the result. The question of introducing the decimal scale into our coinage, must be viewed, not by itself and apart, but in connection with its bearings on the far higher question of a uniform system of weights and measures. We are not called to harmonize, were it possible, our coinage with that of this or the other country,—a scheme which might be practically deranged at any time by their debasing the purity of the standard; but simply to adopt that system which may appear best upon the whole

for this great empire, and for a people the most extensively and actively commercial, perhaps, that the world has ever yet beheld.

In itself, the decimal division of the coinage is not exempt from very obvious and serious objections, as compared even with our present scale. It must operate, in the first instance, with great inconvenience and hardship to the public generally, and in a way not easily obviated, in regard to existing contracts and arrangements. Besides, the decimal system is greatly objectionable, were it on no other ground than that it presents unmanageable fractions, resulting, when reduced decimally in repeaters, circulates, and other interminables, such as thirds and sixths. The number 10 and its multiples offer in comparison a scanty proportion of aliquot parts; while, on the contrary, 12 and its multiples are in this respect comparatively affluent.

But the main objection to a decimal coinage arises from the extreme difficulty of harmonizing it with our existing scale of weights and measures, and thus practically rendering the adoption of a general and uniform scheme of values, weights, and measures almost morally impossible. The number 12 enters so largely into our system of weights and measures, that the attempt to expel it in favour of a decimal scale would in all probability only land us in confusion worse confounded. Even in France, where a decimal coinage has been in use for upwards of half a century, it has not secured uniformity; so inveterate is custom, especially when supported by popular use and convenience. To this day, in Paris itself—the very metropolis of civilization—the cent has not banished the sou from the circulating medium; the latter continues to be the prevailing coin in use among the labouring classes—that is, among the great mass of the population. What would be the fact of the scheme in this country may, therefore, be easily divined: the penny would maintain its ground, and have the better of the mil; and, instead of a uniform system, we should in practise have one compounded of two scales, and thus run into greater complexity than before. How fatal this would prove to the chance of introducing, with any probability of success, a general and uniform system of weights and measures, will be apparent even to the most unreflecting.

It will be wise, therefore, to confine our efforts in the meantime to a well-considered improvement of our existing currency, as a prelude to the greater and more general scheme of reform in our scale of weights and measures. This first step towards so important an end may be effected, I think, by a very simple and slight change in the smallest denomination of our current coin. It requires only that the penny be divided, not into farthings or fourthings, as at present, but into fifths. The new coin may be called a fifthling; or rather, as the Roman capital V represents five, and is the initial also of the Queen's name, it might, for another reason that may appear hereafter, be called a Vee. Then 5 vees = 1 penny, 12 pennies = 1 shilling, 20 shillings = 1 sovereign. Now the vee or $\frac{1}{5}$th of a penny being assumed as the unit of the scale, the shilling = 60, and the sovereign = 1200 vees. Compare this with any of the proposed decimal scales, and its superiority for practical commercial purposes will, I think, be manifest. Take for example, as above, 1200 = 1 sovereign, and 1000 = 1 sovereign, and see how the comparison will stand as to aliquot, and especially as to fractional parts:

	1200 =	1000 =
$\frac{1}{2}$	600 = 10/	500
$\frac{1}{3}$	400 = 6/8	$333\frac{1}{3}$ an intermin.
$\frac{1}{4}$	300 = 5/	250
$\frac{1}{5}$	240 = 4/	200
$\frac{1}{6}$	200 = 3/4	$166\frac{4}{6}$ an intermin.
$\frac{1}{7}$	$171\frac{3}{7}$ an intermin. dec.	$142\frac{6}{7}$ an intermin.
$\frac{1}{8}$	150 = 2/6	125
$\frac{1}{9}$	$133\frac{3}{9}$ an intermin.	$111\frac{1}{9}$ an intermin.
$\frac{1}{10}$	120 = 2/	100
$\frac{1}{11}$	$109\frac{1}{11}$ an intermin.	$90\frac{10}{11}$ an intermin.
$\frac{1}{12}$	100 = 1/8	$83\frac{4}{12}$ an intermin.

We might carrry the comparison further, with the same result; but this may suffice. On examining the above, it appears,—1st. That 1200 of the least denomination of the coinage, divided by numbers from 2 to 12, give sevenths, ninths, and elevenths, fractions when reduced decimally, all interminable; and that, on the other hand, 1000, divided by the same numbers, give thirds, sixths, sevenths, ninths, elevenths, and twelfths, all fractions which expressed decimally are in like manner interminables. 2. That so far, therefore, the advantage of the first scale over the second is as three to one.

Next suppose the sovereign to be the

unit of the scale, divided into 1200 bees, or into 1000; and compare these equal values when raised in decimal progression:

1 sov. =	1200 vees or =	1000
10 „ =	12,000 „ =	10,000
100 „ =	120,000 „ =	100,000
1000 „ =	1,200,000 „ =	1,000,000
10,000 „ =	12,000,000 „ =	10,000,000

The steps of the progression are the same in all; and certainly as easy in one, as in either of the other two.

Again, assuming the lowest denomination as the unit of the scale, proceed as before, in decimal progression:

vee.		
1 =	$\frac{1}{5}$ of a penny.	
10 =	/2	
100 =	/20 =	1/8
1000 =	/200 =	16/8
10,000 =	/2000 =	166/8 = £8 6 8
100,000 =	/20,000 =	1666/8 = 83 6 8
1,000,000 =	/200,000 =	16666/8 = 833 6 8 &c.

It is observable here that the columns of shillings and pounds proceed at each progressive step by the same increment, viz., 6 in the column of shillings, and 3 in that of pounds. 2. That the value of the shillings in sovereigns may be readily found by dividing 16 by 2, and every following figure 6, except the last also by two; carrying the last into the column of shillings: thus—

166/8 = £8 6 8
1666/8 = 83 6 8
16666/8 = 833 6 8 &c.

3. That to convert any decimal number of the lowest denomination into shillings, there must be added to it $\frac{1}{5}$th of the given number: thus—

100 vees + 20 = 120 = 2/
1000 „ + 200 = 1200 = £1 &c.

On the whole, it must be evident, I think, that our present currency, with the very slight change of subdividing the penny into fifths instead of fourths, would, in some respects, be superior to a decimal system, and in others, be equally convenient for commercial purposes;—would, in fact, combine the advantages of both systems, while it would lay the foundation for establishing, in harmony with it, a uniform scheme of weights and measures; as to which, I may perhaps hereafter crave the indulgence of being allowed a column of your valuable Magazine for a very few observations.

Meanwhile, I would throw out a suggestion, that a gold coin might not unfitly be added to the currency, representing the Bank note of £5, and equal 6000 vees or fifths of a penny. The size of the coin, which might be called a Victorine, in honour of her Majesty, and have on one side an equestrian figure of our gracious sovereign, would give scope for the exercise of high art. And though not absolutely necessary, a limited issue, say of 10,000, would not only afford an opportunity of encouraging a beautiful branch of the fine arts, but would be eagerly bought up by the wealthy and the curious in coins and medals, at a price that would more than remunerate the Mint.

I am, Sir, Yours, &c.,
A Collegian.

APPARATUS FOR PREVENTING RAILWAY ACCIDENTS.

To the Editor of the Mechanics' Magazine.

Sir,—I enclose a drawing and description of an invention for the prevention of collisions on railways by hydraulic pressure, which, I hope, will be found to answer the purpose for which I have designed it with efficiency.

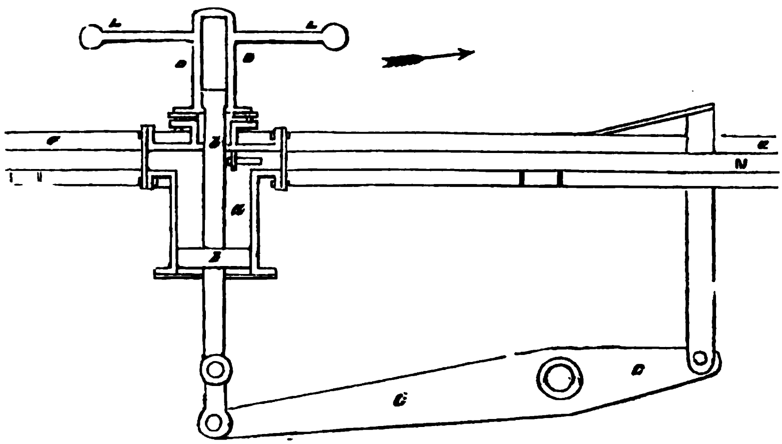
I propose placing between the rails, at equal distances from them on either side, and at a distance of from two to three miles from each other, a succession of cylinders fitted with pistons, piston-rods, &c., throughout the whole length of the line. In the subjoined engraving, *a* is one of the cylinders, and *b* a piston and piston-rod; the top of each piston-rod works in a spiral groove in the cylindrical tube, D, from the upper part of which the arms, L L, project. These arms are parallel with the line of rails when the piston is at the bottom of the cylinder, but when the piston is raised, they are placed at right angles therewith, the circular motion being imparted to the arms by the raising and falling of the head of the piston-rod through the spiral groove in the tube. The piping, N N, connects two such cylinders with each other, and a uniform pressure is maintained therein by a head of water placed a few feet above the level of the line.

Between each cylinder and one line of rails, a lever, *c c*, is placed, one end of which is connected with the under side of the piston, and a connecting piece attached to the other end slightly projects above the rail, *e e* (a break in which is left for the purpose by means of this lever); every train as it passes each cylinder raises the piston in that cylinder, and thereby places the arms at right angles with the line, as above explained.

A valve, *v*, is shown opening into the cylinder, which prevents any flow of water in the direction of the train's motion. The pressure caused by the raising of the piston is consequently exerted in the direction

opposite to that in which the train is proceeding.

A train having passed the first cylinder, in due course arrives at the next; the pressure caused by its piston being raised acting upon the piston in the cylinder first passed returns it to its former position; the arms attached to the cylinder last passed remaining crossed until the next cylinder is reached. A guard is thus left behind each train as it proceeds along the line, and the possibility of a collision would be precluded by simply attaching a gearing to each engine (arranged to shut off the steam and open the whistle),



to be acted upon by the arms when they are at right angles with the line. The disposition of the cylinders along the line could easily be arranged, so that the stations and crossings should be about midway between two cylinders, as in the event of a train being delayed at a station, no other train could approach that station, on the same line of rails, until the next cylinder was passed by that train.

Perfect security could be obtained upon any part of the line (as is often required) by merely raising the piston by manual force in the direction whence the trains approach that part; at crossings, the arms should be kept constantly crossed upon either one or other of the lines that intersect each other, leaving but one open at a time.

The action of the apparatus would be exceedingly simple, and entirely independent of both guards and engine-drivers, thereby insuring that perfect regularity and safety which can be insured only by a mechanical agent.

The first outlay required would not be large, compared with the object to be attained, while it would effect a saving in the working expenses, as the staff of officials now requisite could then be reduced.

I am, Sir, your obedient servant,

J. C. West.

1, Upper Russell-street, Bermondsey,
April 3, 1854.

ENGINEERING INSTRUMENT.

To the Editor of the Mechanics' Magazine.

Sir,—As an illustration of the application of the diagram and problem forwarded to you, and inserted in page 276 of your Number of the 25th March, I now have the pleasure to send you the following sketch and description of a pocket instrument made by Messrs. Elliott, the well-known instrument makers, &c., of the Strand, from the original by Mr. Renton, C.E., for determining the top or cover of the steam-engine slide for any degree of expansion required in the cylinder and the converse; also for extracting the square roots of numbers, or the converse.

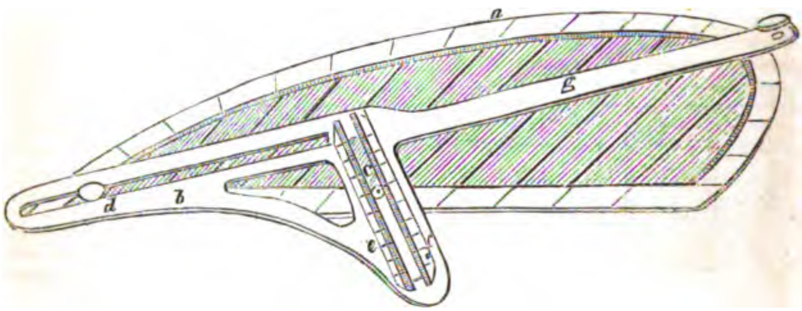
And remain, Sir, yours, &c.,

A Constant Reader.

London, April 3, 1854.

DESCRIPTION AND USE OF AN INSTRUMENT FOR DETERMINING THE LAP OR THE EXPANSIVE EFFECT OF A STEAM ENGINE SLIDE, AND ALSO FOR SQUARING NUMBERS OR EXTRACTING THEIR SQUARE ROOTS.

a is a semicircular plate, having its curved edge graduated in degrees, and its diameter in 100 equal divisions. The graduations on the diameter are continued across the plate by lines intersecting the circle. There are two sets of numbers to this scale, the lowest reaching upwards, and the highest reaching downwards; the latter being used for the steam-slide, and the former for the extraction of the square roots of numbers and the converse.



b is a moveable limb, having two slots at right angles to each other, and working on two pins in the plate; one, *c*, corresponding with the centre of the circle, and serving the purpose of an index, and the other, *d*, at the extremity of the diameter.

e f is a double scale of equal parts, each scale being in length equal to the radius of the circle; *e* being divided into 50 equal parts, and *f* into 100 parts. The divisions of the scale, *e*, are read as decimal fractions, or parts of the diameter of the circle, or of the stroke of the slide; that is, $\frac{50}{100}$, or ·5, and those of *f* as integers and parts. The edge, *g*, of the moveable limb, *b*, is coincident with the centre of the slot and pin, *d*, and is the chord of the arc it intercepts.

To use the instrument for determining the lap or cover of a steam engine-slide in terms of its own stroke, let it, for example, be required to know the lap of a slide, so that the steam may be cut off after the piston has made ·75 of its stroke. Move the limb of the instrument until its edge, *g*, cuts the circle in a point, which, by the cross lines, coincides with 75 divisions of the diameter scale (read downwards), or ·75 of the stroke, and on the scale, *e*, will be found ·25 as the lap of the slide. Or, having the lap of the slide given to find at what point of the stroke of the piston the steam will be cut off; set the scale, *e*, to the decimal number expressing the proportion of the lap to the stroke of the slide, say ·25, and the limb of the instrument will intersect the circle at the point coinciding with ·75 on the diameter scale, the proportion of the piston's stroke required. As the lap and minimum width of port should together be equal to the half stroke of the slide; so if ·25 be the lap, ·25 will be the width of the port.

In the extraction of the square root of numbers, read upwards on the diameter scale the given number, as, for example, 25, and on the scale, *f*, will be found 5, its root. And the converse. Set 5, on the scale *f*, to the index, and on the diameter scale coinciding with the point of the circle intersected by the edge of the moveable limb, *g*, will be found 25, its square. If 2,500 be the number whose square root is required, then 50 on the scale, *f*, will be the root sought. Or if ·25, then ·5 will be the root sought, always varying the reading of the scale, *f*, to the notation employed on the diameter scale.

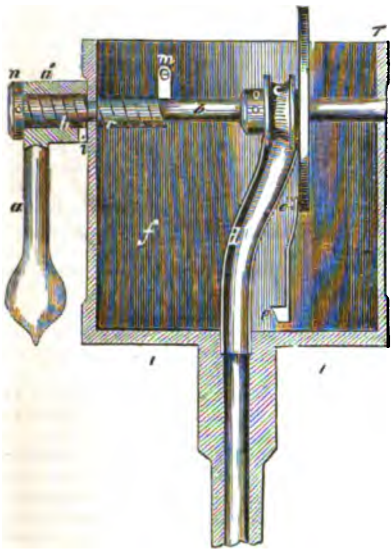
AUTOMATIC LUBRICATOR.

To the Editor of the Mechanics' Magazine.

Sir,—I have forwarded to you the accompanying description of an automatic lubricator that I have designed, as it may, perhaps, prove interesting and serviceable to your readers.

The cup, *f*, has passing through it a

spindle, *b*, on the end of which a pendulum, *a*, works; and *a'*, is a cylindrical socket, embracing the spirally-wound riband or clutch, *h*, which is formed truly cylindrical, so as to fit the spindle, *b*, and which rests, without being fixed, on the washer, *n*, and on the outer end of the spindle, while it is



fixed to the inner end of the socket, as shown at *i*. There is another spiral riband or clutch, *r*, fastened to the inside of the cup at *m*. Within the cup the spindle carries a roller and bucket-wheel, *c*, which are cast in one piece, and fastened to the spindle by the pin, *o*. *e* is an oil-bucket fastened to a wheel-plate by the screw, *e'*.

To understand the action of the apparatus, it is necessary to imagine the machine in motion. When this is the case, the pendulum, *a*, is caused to oscillate, and while receding the clutch, *h*, grasps tight the spindle, which therefore carries with it the bucket-wheel. When the pendulum returns, the clutch, *r*, grasps the spindle, and keeps it from returning, while the clutch, *h*, relaxes, and slips easily over the spindle. After a few vibrations, the charged bucket works round, and empties its contents over the roller, *c*, into the tube, *d*, down which it flows to the journal or surface to be lubricated.

I am, Sir, yours, &c.,
R. S. Thomson.

Cronstadt, Russia, 1854.

EXTINCTION OF FIRE.

To the Editor of the Mechanics' Magazine.

Sir,—I cannot help believing that I have done some service by eliciting the important letter from Mr. Baddeley that appeared in your last Number. At the same time, I feel that it is essential for me to say a few words in reply to it.

I will very briefly state, that I stood in the Strand for about an hour during the time the *Papier Maché* works were burning, and saw three engines, and three engines only, at work, to the best of my belief. Two of these played uselessly against the lower walls of the building, and the third, which played from the upper part of a house in Wellington-street, although it appeared to be a powerful engine, and occasionally worked with great efficiency, was nevertheless frequently quite incapable of forcing water through the opened windows, in opposition to the flames that flared through them. Such were the circumstances that presented themselves to me, and to many others who were near me at the time.

I may have been wrong in my opinions concerning these facts, and can only say that I very willingly accept Mr. Baddeley's statements, with no more reservation than my own experience compels me to make. But I do not agree with that gentleman concerning the fitness of the fire-escapes for carrying hoses to the fire. In the first place, the escapes may, in many instances, be required for the purpose for which they were designed; and in that case they could not, of course, be otherwise employed than in delivering the inmates from danger. In the second place, were it possible for a hose to be managed by a person poised on the top of an escape, still the hose could not, even then, be carried very near to the fire without scorching the man who had the management of it. It is true that they are serviceable for conducting hoses to the roofs of buildings adjacent to that on fire, but that is not all that is necessary, in my opinion.

I am, Sir, yours, &c.,
Homo.

London, April 3, 1854.

ALLAN'S ELECTRO-MAGNETIC ENGINES.

To the Editor of the Mechanics' Magazine.

Sir,—Mr. Sewell, in his letter which appeared in your last, seems to have lost sight of the novel principle embodied in Mr. Allan's engine, viz., the great length of stroke obtained by that arrangement, when

he says, "A more simple application of the same plan." In the engine of Mr. Sewell's friend, the stroke cannot conveniently, or rather effectively, be greater than the distance between the face of his magnet and the remotest point of attraction; whereas, in Mr. Allan's arrangement, the stroke may be five times this length, and this constitutes the new feature in it. Again, in Mr. Allan's engine the faces of the magnet and armature are always parallel, which must be a great advantage; but in Mr. Beckle's engine this is not so, for in every position of the lever or beam, except the horizontal, the armature and magnet form an acute angle with each other, which must necessarily lessen its power.

Nearly, if not all, the old arrangements that I have seen described, are open to the same defects (excepting Professor Page's), as Mr. Beckle's, which renders them nothing more than pretty scientific toys.

Mr. Allan's is decidedly the A 1 of electro-magnetic motive engines.

PETER HART.

Manchester, April 4, 1854.

To the Editor of the Mechanics' Magazine.

SIR,—In my communication regarding Beckle's Electro-magnetic Engine, the name "Electro-magnetic *beam*-engine," from its similar action to the ordinary beam-engine, is given as "Electro-magnetic *steam* engine," which requires this correction.

It may also be mentioned, in reference to the suggestion of Mr. Z. Colburn to extend the tube-plate of a locomotive boiler over the fire, that it was the form of fire-box patented by Mr. Crampton many years ago, and tried by him in his first engines, more particularly by extending the fire-grate under the foot-plate. but now, I believe, abandoned in all his recent engines.

J. SEWELL.

Exposé of the Royal Academy of Arts. By THOMAS SKAIFE. London: Piper and Co., 1854.

WE have heard the publication of Mr. Skaife's work represented as useless, on the ground that the evils it assails are too enormous, and are sustained by too much influence, to be affected by individual remonstrance or reproach. From this representation, however, we entirely dissent, not on account of our possessing any unusual confidence in Royal Academicians, but because we believe every just public denunciation of a corrupt institution to be essentially salutary. At the same time we do not entertain a hope of any immediate good resulting from the present *exposé*, since the Royal Academy has before displayed its ability to foil with ease the gravest and sternest accusations.

In his first chapter Mr. Skaife asks whether the National Gallery, as a public building, ought "to continue to be a 'den of forty ——,' who, by sundry ruses, contrive not only to extract from the pockets of the public from five to ten thousand pounds annually for permission to enter into its own building, but also contrive to stop the progress of those arts, under the pretence to promote which, they have so disreputably succeeded in appropriating to themselves this national property?" And he adds, "To unmask the *modus operandi* by which is perpetrated this national disgrace, is the object of the following pages."

The two great facts brought forward by the author in support of his charges are,—*First*, that the Royal Academicians possess an uncontrolled power over the public exhibitions, and in exercising that power have exhibited great injustice to other artists; and, *Second*, that they direct students "to the study of that which is dead instead of that which is living."

The first of these has already brought considerable opprobrium upon the Academy. "I may state," says Mr. George Rennie, in his examination before a Select Committee of the House of Commons, "with regard to the grievances complained of by artists regarding the exhibition, that the academicians reserve to themselves all the best places; and also, by regulation No. 8, in the printed rules, that three days or more, according to the convenience of the arrangement, at the discretion of the council, shall be allowed *to all members of the Royal Academy*, to finish or paint up their pictures in the places which have been allotted to them, previous to the day appointed for the annual dinner in the exhibition-room. . . . The Academician has the sole privilege of admittance to the exhibition-rooms, where he may retouch and finish his pictures and clean them; in fact, he may put them in the very best condition to be seen; whereas an artist who is not an Academician, submits his pictures to the public view dusty, dirty, and in whatever situation they may remain after the dust and bustle of preparing the exhibition is over." John Martin, the painter, spoke as follows upon this matter, before the same committee. "To show how this works at the Royal Academy, I will instance my own picture of 'Clytie,' which was exhibited there. This picture was placed high up in a corner of the Ante-room, where it was difficult to get

at, and where all the care of the linear and the delicacy of the ærial perspective were lost; and in fact the whole principle of the painting counteracted; but as if this were not sufficient, it was hung up with all the dust which it had received from the time of leaving my room until the varnishing day, when some kind member did me the favour to spill varnish down the centre of the picture whilst the dust was still upon it; and this was not suffered to be removed till after the private view and great dinner. This was done at the Royal Academy, and I had no means of cleansing my picture until the doors were open to the public." We might easily multiply such extracts from the evidence of esteemed artists, did our space permit. These alone, however, are amply sufficient to prove the enormity of the evil that very naturally excites the indignation of Mr. Skaife, and other independent men, who have experienced the ruinous influences of which we complain.

Nor is the author's second charge less just than the first. Every one who has familiarised himself with the modern developments of art in this country must feel the lamentable departures from truth and nature continually made by our young artists as they successively rise up, in consequence of the foolish bias shown by our professors towards antique works. They have taught that the present must be abandoned for the past; that to become a careful antiquarian is to prepare yourself for becoming a true artist. That the past is to be discarded by the student of art we do not, of course, teach. It is against the exaltation of the productions of former generations above the living lessons of the present hour that we protest, believing as we do that, in the words of an eminent living writer, "in our fine arts, not imitation but creation is the aim." The same author elsewhere remarks, "The traveller who visits the Vatican, and passes from chamber to chamber through galleries of statues, roses, sarcophagi, and candelabra, through all forms of beauty cut in the richest materials, *is in danger of forgetting the simplicity of the principles out of which they all spring, and that they had their origin from thoughts and laws in his own breast.* He studies the technical rules on these wonderful remains, but forgets that these works were not always thus constellated;—that they are the contributions of many ages, and many countries,—that each came out of the solitary workshop of one artist, who toiled perhaps in ignorance of the existence of other sculpture, created his work without other model, save life, household life, and the sweet and smart of personal relations, of beating hearts, and meeting eyes, of poverty, and necessity, and hope, and fear. These were his inspirations, and these are the effects he carries home to your heart and mind. . . . . It is in vain that we look for genius to reiterate its miracles in the old arts; it is its instinct to find beauty and holiness in new and necessary facts."

It is eminently true that great artists have not been made by the study of the works of their predecessors; but on the contrary, by the study of the natural world their geniuses were fostered and perfected. It was by his passionate contemplation of the ocean during storms and tempests that Molyn was enabled to exhibit it in its sublime and terrible forms. Lorenesse would never have produced his gorgeous horizons had he not have looked so ardently upon Italian heavens. Bamboccio is said to have derived more from his reveries among the environs of Rome, than from the grandest works contained in that celebrated city. Hobbima learned in Nature's solitudes to paint his grottos, lakes, and temples. Breughel studied landscapes among the Tyrol mountains. Meyer, of Winterthur, pursued his profession in the rich and awful scenes of Switzerland. Rousseau also was familiar with the mountains of Switzerland and the vales of Italy. Backhuysen, of Embden, had himself borne by resolute seamen into the fiercest storms. Wilson formed his style by comparing the productions of his pencil with the scenes of nature. Wright had looked studiously abroad on many a night before he painted his admired moon-light-pieces. Salvator Rosa owed much of his unrivalled excellence in depicting tempests to the time spent in his early life with a band of robbers among the rocks, and caves, and mountains, that they inhabited. The fields were the studio of Claude Lorrain. Titian loved to contemplate natural scenery, or he would never have produced the inimitable back-ground of the *Martyrdom of St. Peter*. But we need not further multiply random examples.

In treating this question, Mr. Skaife, as might be expected, finds occasion to stigmatize Sir Joshua Reynolds, the first President of the Royal Academy, for the teachings inculcated in his celebrated discourses, "which, though teeming with judicious remarks and trite truisms, have nevertheless served to call into question the integrity of their author in proportion as they have proved to have misdirected the application of those students who had the misfortune to confide in them.

"Had a student by superior application in the Academy schools, fortunately or unfortunately for himself, gained a medal, the occasion of its being awarded was embraced by the President to deliver one of those

'golden discourses' which, as already observed, though abounding with excellent maxims on the value of application, equally applicable to the pursuit of any profession, was not on that account the less fatal to the future welfare of the unfortunate student, whose imagination, exalted by the occasion, rendered him an easy dupe to the oft repeated injunction in which these 'golden discourses' usually abounded—'Study the works of the great masters for ever—study the serene majesty of the Grand Style. But it is only in the Vatican and Capella Sistina that you can see the works of Michael Angelo and Raphael.'

"Such was the *refrain* of those Academic discourses, and such their effects, that every student who could raise the means hurried off to Italy to worship Michael Angelo in the Capella Sistina, with the hope of catching a little of this great master's inspiration, and being able to do the like, in order to acquire equal immortality; confiding, rather, to the 'golden discourses' than troubling themselves with those peculiar and exceptionable circumstances which, in the 16th century, developed the genius of those celebrated Italian artists. When the Popes, ambitious of surpassing in magnificence the pontificates of the Cæsars, taxed the Christian world for resources to build temples which, in allegorical imagery, would not have been unworthy of the most pictorial of pagan epochs, and which, at once, should be illustrative of the religion of the Romans and of the enterprising spirit of their pontiffs."

In conclusion, we think we cannot better aid the author than by adding the following important remarks in continuation of the preceding subject:

"The religion of the Italians in the 15th and 16th centuries, being so redolent of pagan usages and pagan imagery, was peculiarly favourable to the development of the genius of Michael Angelo and Raphael; especially at an era which placed in the papal chair that transcendental patron of the arts of peace and war, Julian the Second. An era that produced such a fighting successor of St. Peter, whose anxiety about the embellishment of his own sepulchre, made him on the point of going to war with the neighbouring State of Tuscany for harbouring a runaway sculptor, was better suited to give employment to the painter of the terrible 'Last Judgment,' in the Capella Sistina, than any other epoch which history has yet recorded, either in Italy or elsewhere. And well had it been for the President of the Royal Academy's fair fame and his pupils' future welfare, had this circumstance been effectively pointed out. But as it was not, how could it be expected that those scarcely bearded youths who, fresh from the Academy, had started post haste for the Roman capital; that, arrived there, they should now, like cool sceptics, sit down and commence a philosophical analysis of history, in order to acquaint themselves with the mysteries of political economy; whilst their ears yet tingled with that last of their President's eulogies on the painter before whose works they had now arrived to worship—'To kiss the hem of his garment, to catch the slightest of his perfections, would be glory and distinction enough for an ambitious man.'

"In proportion as the President's insidious advice* is confided in, so is Michael Angelo studied, copied, and imitated.

"Then the student returns to his native land—big with high hopes—sets up his easel, and commences painting history in the grand style; but by the time he has got to the end of his resources, he finds that England in the 19th century is not Italy in the 16th, nor are Englishmen Romans, nor their monarchs popes. And better would it have been for him had he studied nature in a forest or a dog-kennel, than the grand style of Michael Angelo in the Capella Sistina. And however he may attempt to conceal the shipwreck of his hopes by railing against the barbarous taste of his countrymen, before he has succeeded in moulding that taste to his profit, he dies. A second, with less courage, puts through his head a bullet. Whilst a hundred others have lingered or continue to linger out an unprofitable existence, each and every one victims to that treacherous system which this trading company, illusionary called Royal Academy of Arts, is encouraged to pursue in England in the middle of the nineteenth century."

"* It has been observed that Reynolds admired one style and painted another; that with Raphael and Michael Angelo, and 'the great masters,' and 'the grand style' on his lips, he dedicated his own pencil to works of a character into which little of the lofty, and nothing of the divine, could well be introduced. To have explained by what means, and by what studies, he acquired his own unrivalled skill in art, would have been more to the purpose than comments upon Corregio, or Raffaille, or Michael Angelo. He has chosen to remain silent, and artists must seek for the knowledge which made the fortune of Reynolds elsewhere than in his counsel. The President's constant admonitions to study the 'grand style,' and think of nothing but what is heroic or godlike, as a subject for the pencil, have helped to misdirect the minds of students, and beget a monotony of composition, through which nothing but strong and decided genius can break. Few men are born with powers equal to the grandeur of such works; and many a good painter of domestic life may attribute the laborious dullness of his historic compositions to the incessant cry of all Academies about the study of the 'grand style.'—*Allan Cunningham.*"

The Art of Cleaning, Dyeing, Scouring, and Finishing. By THOMAS LOVE, a working dyer and scourer. Longman and Co., London. 1854.

THE composition of this work most unmistakeably attests its authorship. We have seldom seen a treatise of so purely practical a character. We have not, of course, the opportunity of testing the instructions given for performing many of the operations described, but having discovered the accuracy of those we have examined, we have no hesitation in recommending the book as exceedingly valuable. It is, we believe, justly described as a perfect compendium of all that is essential to be known in dyeing silks, woollens, cottons, feathers, bonnets, &c. It contains also complete instructions for cleaning and scouring carpets, hearth-rugs, ancient tapestry, and bed and window-curtains. No person who has to perform the processes of which it treats should attempt to do without the work.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

KRAUT, HENRY, of Zurich, Switzerland, engineer. *Improvements in tools or implements to be used for boring or cutting rock or other hard substances for the purpose of blasting.* Patent dated September 15, 1853. (No. 2143.)

This tool is to be used for increasing the size of a hole at its lower part, and consists of a bar of iron, into the lower end of which is inserted a steel blade, secured by pins or set screws. The blade and bar are tapered off from the cutting edge, and the instrument is worked vertically up and down from above.

KEATES, THOMAS WILLIAM, of Chatham-place, Blackfriars, London, chemist. *Improvements in the distillation of turpentine and other resinous substances and their products.* Patent dated September 15, 1853. (No. 2144.)

Claim.—"The use of heated air as a source of heat applied through the medium of any convenient apparatus in the distillation of turpentine or other resinous matters, in the place of, and as a substitute for, the furnace and open fire, as at present employed."

JEANNERET, HENRY, of Great Tichfield-street, Middlesex, M.D. *Improvements in machinery for digging and tilling land.* Patent dated September 15, 1853. (No. 2147.)

This machinery consists of spades or cutting plates mounted upon a horizontal axis, and of two rings or grooved discs attached to the spades or cutters, or to arms placed near each end of the axis. It consists also of two pins or buttons, which traverse the grooves of the discs or the inner circumferences of the rings. The machine is made to revolve, by means of beams attached at one end to the pins or buttons, and at the other to the animal or mechanical apparatus employed to drive it.

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in distributing printers' type.* (A communication.) Patent dated September 15, 1853. (No. 2148.)

The type in this invention is placed on and between holders, from which it is pressed out by means of springs. These holders are applied around a circular opening in a plate, and the arrangement is such that the type is not allowed to be forced out of the holders until suitable apparatus is brought into a position to receive it.

SMITH, SYDNEY, of Hyson Green Works, near Nottingham. *Improvements in governors for steam engines.* Patent dated September 15, 1853. (No. 2149.)

This invention relates mainly to a method of constructing the throttle-valve of two parts of equal area, which are caused to move off their seats in opposite directions by means of levers. The steam presses the outer ring or valve to its seat, while the inner valve opens by the action of the steam, the ring of the outer forming the seat of the inner valve.

BARSHAM, JOHN, of Kingston-upon-Thames, Surrey. *Improvements in the manufacture of bricks, tiles, and blocks.* Patent dated September 15, 1853. (No. 2150.)

The object of this invention is to form several bricks or tiles at the same time. For this purpose a series of metal moulds are constructed together, and several series are arranged side by side, and carried by a suitable carriage on a railway; and in order to press the earth or clay into these moulds, one or more pressing rollers, mounted in a carriage capable of moving on a railway outside of that on which the carriage with the moulds moves, are employed.

HIGGINSON, FRANCIS, of King William-street, London-bridge, London, Esq. *Effecting certain improvements in the means of setting in motion and propelling ships, vessels, and boats of every description, upon seas, rivers, canals, and inland waters.* Patent dated September 16, 1853. (No. 2151.)

Near the stern of the vessel, in the run on each side, beneath the line of the flotation, the inventor places two steam-engine cylinders in a horizontal position, having working in them pistons, connected by suitable apparatus with pistons working in

two other cylinders or propulsion tubes, also placed horizontally, the latter pistons constituting the propellers.

MUSHET, DAVID, of Coleford, Gloucester, gentleman. *Improvements in steam-engine boiler, and other furnaces.* Patent dated September 16, 1853. (No. 2152.)

This invention consists in a method of constructing and feeding a semi-rotary, a rising and falling, or a sliding furnace-grate.

ICELY, WILLIAM SHELBOURNE, of Bromley, Middlesex. *Improvements in mechanical telegraphs.* Patent dated September 16, 1853. (No. 2153.)

In this invention (which is especially intended to facilitate communications between the captain and engineer of a steam-ship), a hand-lever, by which the captain marks the signal, is mounted on an axis so that it may move in a vertical plane and in a fore and aft direction. The signals "go ahead," "stop," &c., are communicated when the handle is placed in suitable positions.

MEYER, HENRY, of Manchester, engineer. *Improvements in looms for weaving.* Patent dated Sept 16, 1853. (No. 2154.)

The inventor claims—1. An arrangement in which the shed is produced by elevating part of the warp, and lowering the remainder. 2. An arrangement in which an even shed is produced by elevating part of the heddles, and allowing the remainder to descend. 3. An arrangement for producing an even shed, and for raising one or more of the heddles during the descent of those that had previously been raised, while the others remain stationary.

CARRON, WILLIAM, of Birmingham, Warwick, machinist. *An improvement or improvements in signalizing or communicating intelligence.* Patent dated September 16, 1853. (No. 2155.)

This invention consists of a case on the exterior of which is a revolving chamber containing a series of barrels to be charged with gunpowder or other detonating composition, and fitted with nipples which are provided with percussion-caps, and which communicate with the chambers.

THOMSON, ALEXANDER, of Glasgow, Lanark, North Britain, brick-builder, and DAVID LOCKERBIE, of the same place, manager. *Improvements in kilns for baking and burning articles in earthenware.* Patent dated September 16, 1853. (No. 2159.)

Claims.—1. "The use in kilns of circumferential fires with the heated currents therefrom directed upwards through separate channels in each case between inner and outer walls, and thence downwards converging towards the centre of the kiln." 2. "The mode of converging off the heated currents from the bottom of the kiln by passing the currents through a permeable floor (the apertures in which floor gradually diminish in size or extent as they approach the centre) into intermediate or lower labyrinthic passages, discharging the currents into the outer ends of radial bottom flues passing to the chimney." 3. "The use in kilns of fuel-supplying doors for the furnaces disposed along the top of the annular portion of the external wall."

ADCOCK, JOHN, of Marlborough-road, Dalston, Middlesex, cigar-manufacturer. *An improved apparatus for measuring the distance travelled by vehicles.* Patent dated September 16, 1853. (No. 2160.)

Claims.—1. Transmitting to indicating apparatus the motion derived from the carriage-wheel through the medium of a column of air set in motion by the reaction of a spring. 2. The application of lazy-tongs levers for carrying projections, or other indicating media, so as to regulate the distances between such projections to suit various diameters of carriage-wheels. 3. An arrangement of traversing-nuts and screw-shafts for effecting the required indications. 4. The application of protruding-pins whereby the distance travelled may be read off by the touch as well as the sight.

WEATHERDON, BALDWIN FULFORD, of Chancery-lane, Middlesex, and MATTHEW SLADE HOOPER, of Sydenham, Kent. *Certain improvements in railway signals.* Patent dated September 16, 1853. (No. 2161.)

This invention consists in constructing apparatus by which the passage of a train, engine, or carriage, is made to actuate simultaneously the day and night signals by one and the same operation, indicating the time elapsed from the transit by means of escapement or other retarding mechanism, which is entirely self-acting, the movements of the signal being uniform for all trains, and thus protecting the apparatus from the shocks or concussions that would otherwise be produced by those going at great velocities.

BURTON, JONATHAN, of Crawshaw Booth, Lancaster, manager. *Improvements in shuttles for weaving, the whole or part of which are applicable to skewers used in winding and reeling-machines.* Patent dated September 17, 1853. (No. 2164.)

This invention consists in placing on the pegs or spindles of shuttles, or on skewers, tubes which will freely revolve upon them, and in placing the cop which is to be unwound upon these.

NICKELS, CHRISTOPHER, of York-road, Lambeth, and RALPH SELBY, of York-road aforesaid. *Improvements in the manufacture of flexible tubes and bands, and in covering wire.* Patent dated September 17, 1853. (No. 2166.)

This invention consists in combining dies and rollers heated by steam or other convenient means, the rollers being caused to rotate continually in one direction, in order that the supply of material may be constant.

JENNINGS, HENRY CONSTANTINE, of Great Tower-street, London. *Improvements in treating and bleaching resinous substances.* Patent dated September 17, 1853. (No. 2167.)

The inventor claims "the combination of colophane mixed with tallow and all fatty matters in every proportion with nitrate of protoxide, of mercury, and neutral bi-carbonates of soda or potassa, or aqua ammonia or pearl-ashes, as the nature of the animal, vegetable, or mineral fatty matters require, and with paraffine obtained from bog peat coals," &c., &c.

BODE, BARON HENRY DE, of Albert-street, Camden-road. *Improvements in the manufacture of wheels.* Patent dated September 17, 1853. (No. 2168.)

Claim.—The manufacture of bent felloes for wheels, by subjecting the wood to be bent, to heat and oil or fatty matters.

BROOMAN, RICHARD ARCHIBALD, of the firm of Robertson, Brooman, and Co., of 166, Fleet-street, London, patent-agent. *Improvements in the manufacture of soap and saponaceous compounds.* (A communication.) Patent dated Sept. 17, 1853. (No. 2169.)

This invention consists in the employment of bran or husks of cereal grains, such as wheat, &c., taken after the bran is separated from the flour. The bran is treated with an alkaline solution of proper strength, and is completely dissolved, forming in this condition, without any other preparation or manipulation, a superior soft soap.

THOMAS, EDWARD, of Belfast, Ireland, power-loom factory manager. *An improvement in the construction of looms for weaving.* Patent dated September 19, 1853. (No. 2170.)

This invention relates to the process of taking-up in the manufacture of linen cloth.

Claim.—The application to looms of a take-up roller provided on its periphery with teeth or ribs for the purpose.

COLLINS, CHARLES, of the city and county of Hartford, Connecticut, United States, manufacturer. *The manufacture by machinery of tubes from leather or other suitable flexible substance, chiefly for covering the drawing rolls of spinning machinery, but also applicable to other purposes.* Patent dated September 19, 1853. (No. 2171.)

This invention consists in manufacturing the tubes mentioned in the title, by bringing together small portions of the material, and subsequently combining them into one.

*** The final specification of this patent was not filed by the 19th of March, the day it was due, but has been subsequently lodged, the Lord Chancellor having granted a petition for the extension of the time of filing, the plea of the petition being that the *Baltic*, the steamer in which the specification was forwarded from America, had been three days longer than usual on her passage.

ANDERSON, WILLIAM LAMPHIER, of Norwood, Surrey, gentleman. *Improvements in propelling ships and other vessels.* Patent dated September 19, 1853. (No. 2172.)

This invention consists in propelling vessels by means of paddles, which are arranged and worked so as to feather in a manner somewhat similar to the oar in rowing. We shall probably give a full description of this invention shortly.

RESTELL, THOMAS, of the Strand, Westminster, chronometer-maker. *Improvements in opening and closing ventilating louvres.* Patent dated September 19, 1853. (No. 2174.)

This invention consists in adapting to one side of the frame in which the louvres are mounted a rod, with as many pins or studs projecting from it as there are louvres (the latter being retained in separate frames), for the purpose of opening and closing the louvres simultaneously to any required extent.

WALKER, HENRY, of Gresham-street, London, manufacturer. *Improvements in the mode or means of stopping or retarding vehicles used on railways.* Patent dated September 20, 1853. (No. 2177.)

This invention consists in employing the power exerted on the buffers and buffer-rods for the purpose of putting the breaks upon the wheels.

SERVAN, ARISTIDE MICHEL, of Philpot-lane, London. *Improvements in distilling fatty and oily matters.* Patent dated September 20, 1853. (No. 2179.)

Claim.—"The employment of metallic bodies, rising to or formed with points, in stills when distilling fatty or oily matters; and combined therewith, the introduction of boiling water or steam at a low temperature, and also the use of light floating matters on the surface of fatty or oily matters when distilling the same."

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in life-preservers.* (A communication.) Patent dated September 20, 1853. (No. 2180.)

This invention consists in applying, under the divided top of a stool or chair, two or more cans or other buoyant articles, and in so arranging the seat that it can be opened longitudinally, and so that the two parts can be held together when opened by

hinges or their equivalents, in such manner that when open it is capable of enclosing the body of a person, the legs of it forming the sides, and the seat the two ends of a species of rectangular frame.

POTTS, FERDINAND, of Birmingham, Warwick, tube-manufacturer. *Improvements in the manufacture of taper tubes, and in the apparatus connected therewith.* Patent dated September 20, 1853. (No. 2181.)

Claims.—1. The tracing the edges and cutting up sheets of metal into pieces for taper purposes, without first marking or scribing the shape of the piece or pieces to be cut out with circular or other shears. 2. A mode of rounding or finishing taper tubes by gradually applying pressure downward on the face of the tube, at the same time that the tube is revolving on a suitable mandril.

STOCKIL, WILLIAM, of Long-lane, Surrey, cutler. *A new or improved method of blocking leather used in the manufacture of boots.* Patent dated September 20, 1853. (No. 2182.)

Claim.—The method of constructing the cheeks of upright guillotine machines of metallic projections or ribs, each projection having an independent action, and being capable of adjustment. Also, the placing of vulcanized India-rubber or other springs at the backs of the ribs and shoe pieces.

NEEDHAM, HENRY, of Wardour-street, Middlesex, gun maker. *Improvements in revolving fire-arms.* Patent dated September 20, 1853. (No. 2184.)

The object of these improvements is to prevent the jolting of the fire-arm and the consequent unsteadiness of aim produced by the ordinary mode of effecting the revolution of the chambers by the pull of the trigger. This is effected by making the tumbler in the lock with a notch or "bent," and by making another notch or "bent" in the lifter which takes into the ratchet on the back of the breech, and forming the inner end of the trigger with two projections, by which means very little power will be required to cause the chambers to revolve. Another advantage is also gained by this arrangement, as in it the barrels are caused to revolve by pulling up the cock. In order to prevent the breech from sticking after several shots have been fired, a tube is placed on the under part of the barrel, which fits into the centre of the breech and round which it revolves.

*** The documents of No. 2175 are still with the law officers, under objection.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HILLIARD, HARVEY, of Glasgow, Lanark, North Britain, of the firm of Hilliard and Chapman, cutlers. *Improvements in apparatus for cleaning table cutlery.* Application dated September 15, 1853. (No. 2145.)

This invention relates to various modifications of existing apparatus for cleaning cutlery, and consists in forming the drum or containing-box entirely or chiefly of cast metal to avoid the tendency to warp and get out of shape attending those hitherto constructed of wood.

KNUTH, LUDWIG FREDERICK HERMANN CHRISTOPH, of the Old Bailey, London. *Improvements in the manufacture of purses, cigar-cases, reticules, bags, tobacco-pouches, and other similar articles.* Application dated September 15, 1853. (No. 2146.)

This invention consists in forming the sides or bodies of the articles enumerated in the title of elastic material.

NEWTON, FRANCIS BIRKIN, of Manchester, Lancaster, tailor. *Improvements in the mode or method of cutting and making up garments, so as partially to dispense with seams or sewing.* Application dated September 16, 1853. (No. 2156.)

The specification of this invention merely gives a few examples of reducing the number of the seams of garments by cutting out in one what now is formed in several pieces.

BARCLAY, ANDREW, of Kilmarnock, Ayr, North Britain, engineer. *Improvements in arranging and working mining engines.* Application dated Sept. 16, 1853. (No. 2157.)

The object of these improvements is to avoid "over winding" and injury to the mining mechanism, and they are effected by adapting the ordinary link-motion to the hand-gear of the engine, so that the attendant can easily stop and reverse his engine at the exact moment required.

BARCLAY, ANDREW, of Kilmarnock, Ayr, North Britain, engineer. *Improvements in lubricating shafts or revolving metallic surfaces.* Application dated September 16, 1853. (No. 2158.)

In this invention the shaft is formed with a projecting collar upon it, of the length of the intended bearing, and the brasses are formed to suit this modification. Each brass extends considerably past the edge of the collar, and is slightly turned out or recessed, so that the angles of the collar shall be slightly over-lapped by the brass. Beyond this over-lap, on each side the extended portion of the brass is hollowed out internally, to form an annular cup for the reception of oil, and these edge-cup pieces are well overhung and brought close to the plain part of the shaft, to prevent the entry of dirt. The inner face of the upper brass is inclined downwards from each side towards the centre, instead of being square

across as usual, and the result is that the oil supplied from the top in the usual way is well spread over the frictional surfaces, and, flowing down, is caught by the annular cups of the brasses, and retained therein for continued use.

LILLY, THOMAS EDWARDS, of Birmingham, Warwick, coach-builder. *Improvements in certain kinds of carriages.* Application dated September 17, 1853. (No. 2162.)

This invention applies to carriages that have but one pair of wheels, and are connected with the axle by means of springs, like Hansom cabs, and consists in connecting the step by which the driver mounts to his seat, and the iron or frame on which the luggage is placed underneath the vehicle, with the axle of the carriage instead of with the body or springs, as is usual.

BAKER, ARTHUR JOHN, architect, of Burton-crescent, London. *Strengthening vessels of timber and iron.* Application dated September 17, 1853. (No. 2163.)

The inventor states, that in carrying out his invention, a truss or frame of timber or iron is to be constructed along the middle of the vessel; or two trusses or frames along the sides of it with cross trusses between them.

LITHERLAND, RICHARD, of Liverpool, Lancaster, clock-maker, and THOMAS PICTON, of Toxteth-park, near Liverpool, wheelwright. *An improved mode of manufacturing brushes, and in machinery for applying the same to the purposes of polishing and cleaning.* Application dated September 17, 1853. (No. 2165.)

The inventor prepares a stock or foundation of wood, or other material, shaped to the form required for the brush, but in place of boring round holes therein for the bristles to be inserted into, he forms in the stock long undercut grooves or slots of any convenient shape, into which he inserts the bristles, and wedges them in with wood.

STEPHENS, JOHN, of Richmond, Surrey, Esq. *Improvements in obtaining motive power by the aid of air, steam, and other expansive gases.* Application dated September 19, 1853. (No. 2173.)

The inventor proposes to employ pipes containing air-tight plungers connected with rods and with other pipes communicating with air-pump chambers.

FLETCHER, ROBERT, of Birmingham, Warwick, gun-maker, and JOHN SMITH, of Birmingham, Warwick, gun-maker. *Improvements in fire-arms, and discharging the same.* Application dated September 20, 1853. (No. 2176.)

These improvements consist in constructing a breech-loading gun or other fire-arm, as follows:—The barrel of the gun is made to slide on the stock, so that the open breech end may be presented for the purpose of introducing the cartridge. When made to slide back, so that the breech end shall be closed, a partial turning of the barrel is made to secure it.

BELOUD, JOHN LOUIS, SAMUEL CAMILE BELOUD, and GEORGE GUYATT, all of Greek-street, Soho, Middlesex, cutlers and surgical instrument makers. *Improvements in shears.* Application dated September 20, 1853. (No. 2178.)

This invention consists in forming each leg of the shears of two separate pieces of metal, instead of one piece, as is usual.

PROVISIONAL PROTECTIONS.

Dated February 27, 1854.

475. Richard Archibald Brooman, of 166, Fleet-street, London, patent-agent. An improvement in the manufacture of tin foils or sheets. A communication.

Dated March 3, 1854.

517. John Augustin Boyle, of Alfred-place, Bedford-square, London. Crushing or reducing to powder, pulp, or wash, any matter.

Dated March 7, 1854.

543. Jeremiah Johnson, of Church-street, Leatherhead, Surrey. A new stop for railway and other carriages.

Dated March 11, 1854.

589. John Maynard, of Drury-lane, Middlesex, music-wire drawer. An improvement in strings for pianofortes and other stringed musical instruments.

591. James Wright, of Manchester, Lancaster, merchant. Improvements in machinery or apparatus for "curing" and "liquoring" sugar by centrifugal force without acidifying or injuring the syrup. A communication from John Reid, of Jersey, United States.

593. William Symington, of Gracechurch-street, London. Improvements in apparatus for heating air by means of steam.

595. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in lighting. A communication from Alexandre Martin, of Paris, France, gentleman.

597. John Buchanan, of Leamington Priors, Warwick, gentleman. Improvements in the propellers and apparatus used for propelling vessels.

Dated March 13, 1854.

598. Laurence Whitaker, of Haslingden, Lancaster, cotton-spinner, John Diggle, of the same place, manager, and George Howarth, of the same place, overlooker. Certain improvements in machinery or apparatus for spinning cotton and other fibrous materials.

599. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. An elastic breeching apparatus for cannons. A communication from George Morris Knevitt, of New York, United States, gentleman.

600. Benjamin Latchford, of St. Martin's-lane, Middlesex, lorriner. Improvements in saddlery or harness.

601. John Glenny, of the Strand, Middlesex, outfitter. A portable camp-bed.

602. Edward Haeffely, of Radcliffe, Lancaster, chemist. An improved mordaunt to be used in printing and dyeing textile materials and fabrics, applicable also to the process of bleaching.

603. Edward Haeffely, of Radcliffe, Lancaster, chemist. Improvements in the manufacture of stannates of soda, potash, and ammonia.

604. James Wright, of Park street, Kennington, Surrey, oven-builder. Improvements in the construction of furnaces for the purpose of consuming more effectually than heretofore the smoke contained therein.

605. John Walker, of the City-road, Middlesex, engineer. Improvements in raising stamps employed for crushing, and rams or monkeys employed in pile-driving and other like operations.

606. George Hopper, of Houghton le-Spring Iron Works, Durham, engineer. Improvements in pins for railway chairs.

607. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in sewing-machines. A communication from Mesdames Adrienne Elisabeth Figuier and Euphrasie Chérault, of Paris, France.

608. Auguste Edouard Loradoux Bellford and Persius Ristori, of Castle-street, London. Improvements in inflating life-belts, buoys, and articles of a similar nature. A communication.

Dated March 14, 1854.

609. Frederick Russell, of Clarence-gardens, Regent's-park, Middlesex, mechanic. Improvements in apparatus for clearing obstructions on railways.

611. John Holley Swan, of Glasgow, Lanark, commission-merchant. Improvements in drying bricks, tiles, and other articles made of brick-earth.

613. James Woodford, of Hatton-garden, watch-maker. A smoke-consuming rotary grate.

Dated March 15, 1854.

615. Peter Armand Lecomte de Fontainemoreau, of South-street, London. Improvements in producing waterproof stuffs. A communication.

617. Thomas Kaye, of Huddersfield, York, iron-monger. Improvements in the manufacture of gas, and in the apparatus employed therein.

619. Joseph Pimlott Oates, of Lichfield, Stafford, surgeon. Improvements in the manufacture of bricks, tiles, pipes, and such other articles as are or may be made of clay.

621. John Houston, junior, of Glasgow, Lanark, mill-manager. Improvements in working steam boilers, and in apparatus connected therewith.

623. William Weatherley and William Jordan, of Chartham, near Canterbury. Improvements in steam boilers.

625. Thomas William Keates, of Chatham-place, Blackfriars, London, chemist. Improvements in the means of distilling turpentine and other resinous matters, and in manufacturing boiled or drying oils.

62[illegible]. Miles Binns and John Pollard, both of Bradford, York. Improvements in apparatus for combing wool, cotton, silk, flax, or other fibrous substances.

Dated March 16, 1854.

628. Cyprien Poisson, gentleman, of Paris, and Louis Jacques Martin, engineer, of Paris. Improvements in printing fabrics. Partly a communication from Henri Louis Talle, of Paris.

629. Robert Weare, of Princes-road, Woolwich, Kent. Improvements in the construction of galvanic batteries, and in apparatus connected therewith.

630. Donald Bethune, of Toronto, Canada West. Improvements in the construction of vessels propelled by steam.

631. Frederick William Emerson, of Trereiffe Chemical Works, near Penzance, Cornwall, manufacturing chemist. Improvements in machinery for pulverising, washing, and amalgamating quartz, and matters containing gold and silver.

632. James Cavanah, of Liverpool, Lancaster, builder. Improvements in sails for navigable vessels, and in the apparatus for working them.

633. John Lilley, of Birkenhead, Chester, merchant. A new material, suitable for spinning either alone or combined with other fibres, and suitable to the manufacture of pulp; also certain machinery employed in the preparation thereof.

634. James Garth Marshall, of Leeds, York, flax-spinner, and Peter Fairbairn, of the same place, machinist. Improvements in machinery for combing flax, tow, wool, hair, and other vegetable or animal fibres.

Dated March 17, 1854.

635. John Gerard, of Guernsey, soap manufacturer. Machinery for cutting and stamping soap.

636. William Holt, of Bradford, York, organ-builder. Improvements in reed-pipes for organs.

637. Rice Williams Harris, of Birmingham, Warwick, glass-manufacturer, and Thomas Patstone, of Birmingham aforesaid, warehouse clerk. An improvement or improvements in shades or glasses for gas and other lamps.

639. Thomas Walker Scott, of South Devon-place, Plymouth, Devon, esquire. Improvements in the preparation or manufacture of Devonian limestone.

640. Alexander Hendry, of Port Glasgow, Renfrew, baker. An improvement in heating bakers' ovens.

641. George Harman Barth, of Mornington-crescent, Hampstead-road, Middlesex, medical galvanist. Improvements in the mode of supplying and administering gases for the alleviation and cure of certain diseases.

642. Thomas Bassnett, of Liverpool, Lancaster, optician and nautical instrument maker. An improved mode of compensating for the deviation of the needle of ships' compasses occasioned by local attraction.

643. James Hughes, of James-street, Bethnal-green-road, Middlesex, designer. An improved mode of operating the Jacquard apparatus of looms employed in figure-weaving.

Dated March 18, 1854.

644. George Waide Reynolds, of Birmingham, Warwick, manufacturer. A new or improved fabric to be used in the manufacture of stays or corsets.

645. John Hyde, of Stockport, Chester, spindle and flyer-maker, and John Harper, of the same place, manager. Improvements in the construction of spindles and flyers for roving and slubbing frames.

646. John Hick, of the Soho Iron Works, Bolton-le-Moors, Lancaster, engineer. Improvements in apparatus for heating the cylinders of steam engines.

647. William Thorne, of Barnstaple, Devon. Improvements in reducing metallic ores.

648. William Dantec, of New Quay, Liverpool. Improvements in purifying water.

Dated March 20, 1854.

650. Paul Rapsey Hodge, of Moorgate-street, London, civil engineer. Improvements in reducing metallic ores.

652. Robert Tempest, of Rochdale, Lancaster, and James Tomlinson, of the same place, machinists and copartners, and Henry Spencer, of the same place, manager. Certain improvements in the method of cleansing sheep's wool and in the machinery or apparatus connected therewith.

654. Henry Moore, of the Junction Foundry, Hull, York. An improved template for facilitating the building of iron ships and vessels.

656. François Loret-Vermeersch, of Malines, Belgium. Improvements in looms for weaving.

660. John Longbottom, of Merrion-street, Leeds, York, engineer. Improvements in combining at-

mospheric air with hydro-carbons for the purposes of light and heat. A communication.

662. Joseph Perkins, of Kennington, Surrey, architectural modeller. Improvements in working metals, especially adapted for producing surfaces for blocks for printing calicoes, silks, paper, and other fabrics.

664. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in sewing-machines. A communication.

Dated March 21, 1854.

666. Jean Daniel Pfeiffer, of Rue Princesse, Paris, France. Improvements in book-binding. A communication.

668. John Polson, of Paisley, Renfrew, starch manufacturer. Improvements in the manufacture of starch.

Dated March 22, 1854.

670. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in japanning leather and other fabrics. A communication.

672. John Sheringham, of Edwardes-square, Kensington, Middlesex, esq. Improvements in the construction of kettles and other like domestic utensils, and in the means of supporting or retaining the same in proper position when in use.

674. George Sterry, of Worcester, carver and gilder. Improvements in the manufacture of mouldings, suitable for cornices, picture-frames, architectural decorations, and other like purposes.

676. Thomas Simons Watson, West Strand, Middlesex, esquire. An improved railway traverser.

678. John Horsfall Robinson, of Hebden bridge, York, cotton-spinner. Improvements in steam-boilers.

680. Robert Owen White, of Swanscombe, Kent. Improvements in the manufacture of portland cement.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March 31st,* 1854.)

2584. Henry Wiglesworth. Improvements in connecting together or coupling railway carriages.

(*From the "London Gazette," April 4th,* 1854.)

2524. Mark Newton. Certain improvements in the construction of carriages, and in the means of preventing the overturning of the same when horses take fright. A communication.

2525. Arthur Elliott. Improvements in looms for weaving.

2554. Peter Hindle. Improvements in power-looms for weaving.

2559. George Nasmyth. Improvements in the construction of steam boiler and other furnaces.

2562. William Crosland. Improvements in apparatus for governing the speed of steam and other motive power engines.

2577. William Beckett Johnson. Improvements in steam engines, and in apparatus for indicating the pressure of steam.

2583. Jonathan Grindrod. Improvements in steam engines.

2619. James Hill Dickson. Improvements in the process of preparing flax or similar fibrous material, and rendering it fit for spinning and weaving.

2666. John Henry Johnson. Improvements in thrashing-machines, and in apparatus connected therewith. A communication.

2669. Thomas Bourne. Improvements in the construction of buckles.

2670. Augustus Johann Hoffstaedt. An improved mode of preparing the colour known as artificial ultramarine.

2767. John Walmsley and John Ingham. Improvements in looms.

2772. Alexander Macomie. An ornamental piece of furniture, shaped like a vase, constructed to contain or form a writing and drawing-desk.

2955. James Hunter Campbell. An improvement in machinery for cutting corks.

111. Henry Corlett. Improvements in springs for railway and other carriages and vehicles.

127. Joel Spiller. Improvements in measuring and mixing, crushing, grinding, and pulverizing wheat and other substances.

183. John Bird. Improvements in kilns for burning bricks and other articles.

303. Alfred Vincent Newton. Improvements in bleaching textile fabrics. A communication.

326. James Young. Improvements in gas-making.

392. Benjamin Weston Wells. Improvements in printing floor and other cloths.

431. James Boydell. Improvements in applying apparatus to carriages to facilitate the draft.

457. Auguste Edouard Loradoux Bellford. Certain improvements in engines for generating power by means of the expansive force derived from heated air and gases, or by means of the expansive force of liquid carbonic acid and other expansible liquids. A communication.

475. Richard Archibald Brooman. An improvement in the manufacture of tin foils or sheets. A communication.

510. Andrew Barclay. Improvements in lubricating shafts and revolving metallic surfaces.

563. George Thomas Selby. Improvements in machinery for the manufacture of tubes and pipes and for shaping tubular and circular metal articles.

591. James Wright. Improvements in machinery or apparatus for "curing" and "liquoring" sugar by centrifugal force without acidifying or injuring the syrup. A communication.

595. John Henry Johnson. Improvements in lighting. A communication.

600. Benjamin Latchford. Improvements in saddlery or harness.

610. Albert Wentworth Conner. Improvements in the apparatus used for moulding bricks and lumps.

613. James Woodford. A smoke-consuming rotary grate.

617. Thomas Kaye. Improvements in the manufacture of gas, and in the apparatus employed therein.

621. John Houston. Improvements in working steam boilers and in apparatus connected therewith.

634. James Garth Marshall and Peter Fairbairn. Improvements in machinery for combing flax, tow, wool, hair, and other vegetable or animal fibres.

637. Rice Williams Harris and Thomas Patstone. An improvement or improvements in shades or glasses for gas and other lamps.

664. Richard Archibald Brooman. Improvements in sewing machines. A communication.

680. Robert Owen White. Improvements in the manufacture of Portland cement.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed April 1, 1854.

2244. Edward Davies.
2255. William Joseph Thompson.
2273. John Wright.
2304. Henry Kraut.

1854.

194. Thomas Wicksteed.

Sealed April 4, 1854.

2274. James Thomson Wilson.
2279. John Mason.
2282. Julius Schönemann.
2780. James Alexander Manning.
3022. Alfred Vincent Newton.

1854.

10. David Kennedy.
38. William Edward Newton.
142. Robert Angus Smith and Alexander Mac Dougall.
166. John Getty.
186. William Edward Newton.

Sealed April 5, 1854.

2275. Henry John Betjemann.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

G. G., Vauxhall.—We are not aware if any plan has yet been suggested for effecting the object you mention, beside that of placing vulcanized India-rubber between railway-chairs and the sleepers, which invention has been patented. We should think your application ought to be made to the Directors.

John Calvert.—You will probably have seen, since the date of your letter, the description we published last week of Ruthven's system of propulsion. Since 1850, numerous inventions for propelling vessels without the use of screws or paddles of any description have been patented. See *Mechanics' Magazine*, Vol. 52, pages 338, 437—Vol. 53, page 159—Vol. 54, page 198,—and Vol. 57, page 138.

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Mechanics' Magazine.

No. 1601.] SATURDAY, APRIL 15, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

WHITELAW'S PATENT HIGH-VELOCITY STEAM-ENGINES FOR DRIVING SCREW-PROPELLERS, &c.

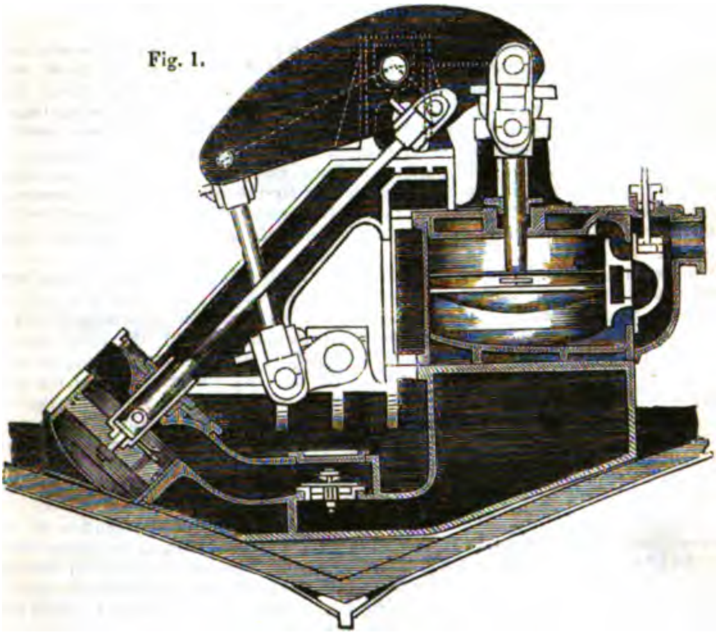


Fig. 1.

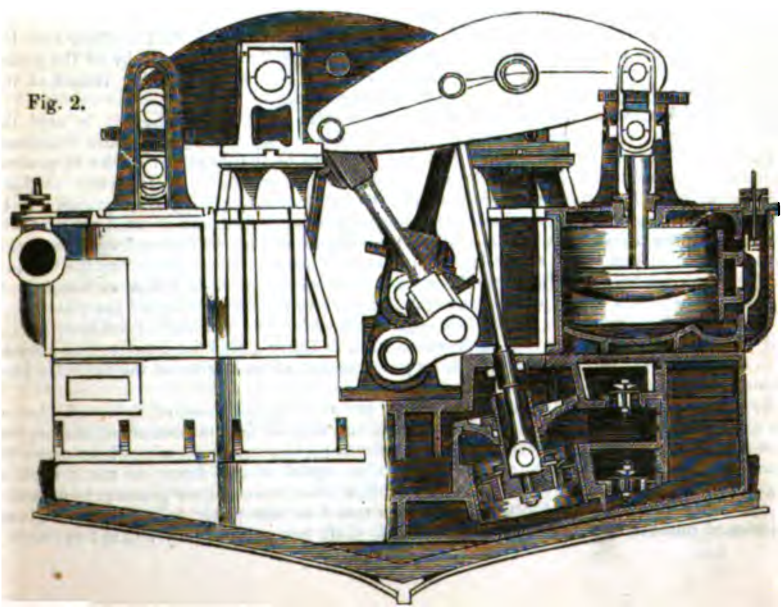


Fig. 2.

WHITELAW'S PATENT HIGH-VELOCITY STEAM-ENGINES FOR DRIVING SCREW PROPELLERS, &c.

To the Editor of the Mechanics' Magazine.

SIR,—The accompanying engravings represent my patent steam-engines for actuating screw-propellers, centrifugal pumps, fans, corn-mills, threshing mills, rag engines, and every description of machinery that requires to be worked at high or considerable and uniform velocities.

Fig. 1 is a side view, mostly in section, of one of a pair of vertical cylinder engines for a screw steam-ship. In this figure the eduction valves of the air-pump are not shown, but they may be placed inside of a casing bolted to the flanch round the discharge-port. Fig. 2 is a side-view of a pair of engines, both of which rest on the same sole plate, and fig. 3 is a side view of one of a pair of horizontal cylinder engines. The main centre spindle, and the crosshead which connects the outer ends of the two piston-rods of each engine, work in straight guides, as shown; but parallel motions may be used in place of horizontal guides for the crosshead, and the vertical guides for the main centre. These, and the engines represented in fig. 2, are also for screw steamers. I have not thought it necessary to describe the parts in detail, as the arrangement will be readily understood from the engravings.

By inspecting fig. 3, it will be seen that if the length of the sway beam were increased to a slight extent, and if the piston-rod and crosshead, the main or top centre, and the pin that the end of the connecting-rod works on, were arranged in a similar manner to what they are in the beam represented in fig. 2, the axial line of the cylinder would be brought so much above the top of the cranks, that each engine could be made with one in place of two piston rods. By inclining the axial line of the cylinder somewhat off the horizontal position it occupies in fig. 3, or if the sway beam were slightly bent, in the manner shown in figs. 1 and 2, this end might perhaps be more readily attained. In these engines the stroke of the piston is short, to allow the crank or screw shaft to revolve at the high or considerable speed required without increasing the velocity of the piston, and that of most of the principal moving parts of the engine beyond the usual rate.

By inspecting the different figures, it will be seen that three of the centres, or axes of the sway beam, are so placed as to cause the length of the crank to be greater than half the stroke of the piston; and as the pressure on the main centre, the strain on the connecting-rod centre or pin, and those on the connecting-rod and the crank-pin are, by this disposition of the centres referred to, diminished, the diameter of the gudgeons or rubbing parts of those centres, and that of the crank-pin, as well as the strength of the working beam and the connecting-rod, may be reduced.

In the engine represented by fig. 1, the length of the stroke is 22½ inches, and the crank is 18 inches long; and in the engines shown in figs. 2 and 3, the stroke of the piston is 24 inches, and the length of the crank 19⅕ inches, as marked; or the length of the crank is obtained by multiplying that of the stroke by ·8.

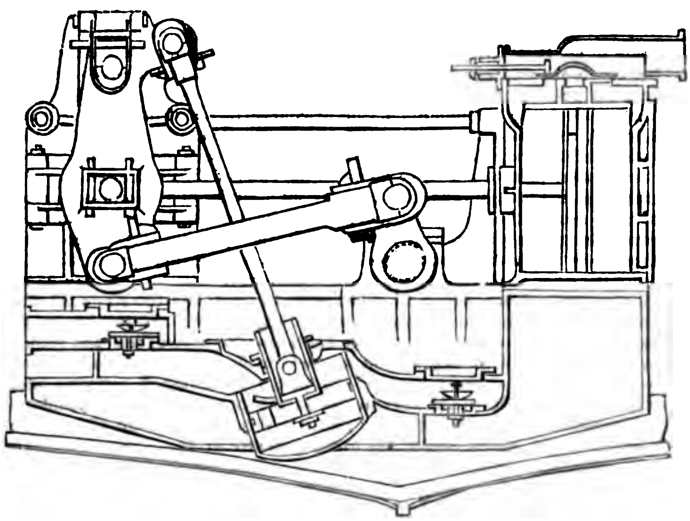
The multiplier ·8 was taken for no very good reason, except that when it is used the coefficient, which represents the power or efficiency of the kind of engine above described, is the same as that of one of the ordinary kind, with twice the length of stroke of piston; or the diameter of the cylinder and the pressure of the steam being the same in both cases, as much of the power communicated to the crank-pin by the connecting-rod will be transmitted through the crank-shaft of the new engine with a stroke of 24 inches, as will be made to pass through the crank-shaft of the old engine with 48 inches length of stroke. That the efficiency in the one case is the same as it is in the other is proved by the formula for the crank contained in Professor Moseley's work on Engineering and Architecture. If the stroke is short, a high speed of the crank-shaft, and a slow velocity of the piston, and most of the other moveable parts of the engine, are obtained. The cost of such an engin will be small; it will occupy but little space, and, as above stated, its construction may be such that the power or efficiency will be as great as that of an engine of the ordinary kind with a long stroke.

Suppose the velocity of the piston 400 feet per minute, the speed of the crank-shaft of the engine represented in fig. 1, would be 106⅔, and that of the crank-shaft of the engines shown in figs. 2 and 3, 100 revolutions per minute; and thus, with somewhere about the usual velocity of the piston, a sufficiently high speed of the screw or crank-shaft of engines for steamers may, without toothed wheels or other intermediate gearing, be obtained. If 400 feet per minute be thought too high a speed for the piston to work at, the above-mentioned number of revolutions of the crank-shaft per minute may be kept up, even if

the speed of the piston be reduced by diminishing the length of the stroke; and should it be considered that the velocity per minute of the piston may with safety and economy be carried above 400 feet, the length of the stroke may be increased, if in the time named no more than 100 revolutions are required, or more than 100 revolutions per minute may be got without altering the length of the stroke; as, however short the stroke of the new engine may be, the efficiency will be the same as it is in an engine of the ordinary construction with twice the length of stroke, it is evident that the proper speed may always be communicated to the screw-shaft direct from the connecting-rod, or without wheels or intermediate gearing of any kind.

It is of great importance to get rid of wheels and all kinds of intermediate gearing, provided the engine can be worked economically without them (and I have no doubt that this can be effected), as in the screw steamers examined by me, the loss of power from friction on the teeth of the wheels, and the journals of the shafts, is not less than 12 per cent. of the whole power of the engines. Wheels of large diameter cannot be used in screw steamers, and the greater portion of this loss of power from friction is caused by the large pitch of the teeth and the small diameter of the wheels. Professor Moseley, in the work I have before alluded to, has given formulæ, by means of which the loss of power caused by the friction on the teeth of wheels, and the journals of the shafts, may be

Fig. 3.



determined. 92 per cent. of the power communicated by the connecting-rod to the crank-pin will be transmitted through the crank-shaft, or 8 per cent. of that power will be lost if the engines be the same as those herein represented, and this also will be the amount of loss in engines of the usual construction, with twice the length of stroke. But as wheels are required to bring up the speed of the screw-shaft, if the stroke of the actuating steam-engine is long, the loss from the friction caused by the wheels must, when the engine has a long stroke, be added to the loss arising from the same cause in connection with the crank; so only 8 per cent. of the power communicated by the connecting-rod to the crank-pin will be lost if the new engine is used, and $12+8=20$ per cent. will be the loss if the power is supplied by a steam-engine of the ordinary kind. Besides this 12 per cent. extra of the power thrown away when the old engine is used, there is the risk and inconvenience of stoppages occasioned by the breaking of the wheels, the tear, wear, trouble, and expense connected with wheels and intermediate gearing, which would be avoided if the new engine were substituted for the old.

The figures are drawn to a scale of one-fifth of an inch to a foot; and if they be measured by that scale, it will be found that the floor space occupied by the engines shown in figs. 1 and 3 is not so great, and that occupied by the pair represented by fig. 2 is much less than

it is even in the very compact arrangement suggested by Mr. Atherton; and were the length of the connecting-rods reduced to the same extent as it is in his engine, this, with a few other obvious enough alterations, would make the engines represented by figs. 1 and 2 stand about as low as his. The engine shown in fig. 3 is lower; the other two would be, even if they were altered in the way explained; but its height might somewhat farther be reduced, only in a different way from that suggested for lowering the other two engines. Mr. Atherton's engine and the engines shown in figs. 2 and 3, have a stroke of two feet; but on the principle before explained the unequally divided sway-beam, or rather the long crank, renders the new engine much more efficient than his. If the length of the stroke of the new engine were reduced so much as to make the coefficient of effect the same as it is in Mr. Atherton's engine, the floor space and the height it would occupy would be far less than in his; and even in this case the efficiency of the new instrument would be much higher than that of the other, as toothed-wheels would not be required to transmit its power from the crank-shaft to the screw-shaft. I may add, that not more than 84 per cent. of the power communicated by the connecting-rod will be transmitted through the crank-shaft of Mr. Atherton's engine; and if the per centage of power required to overcome the friction caused by the spur-wheels be added to this, it will be seen that if his engine be used, the whole power will be greatly reduced. As the crank-shaft of Mr. Atherton's engine is on one side of the ship, spur-wheels cannot be dispensed with. Mr. Atherton might bring the crank-shaft of his engine in a line with the screw-shaft; but then the coefficient of effect would be low, on account of the shortness of the stroke, and the engine would not stand lower, if so low, as it does in the form he has given it.

As it appears to me that risk and want of economy are inseparable from engines with a long stroke, which are worked at a speed so high that they turn the screw-shaft without wheels, I shall say nothing more about them at this time.

The air-pump jacket, the induction and the discharge-valves of the engines represented by figs 1, 2, and 3, can readily be got at. There are two doors for getting to the valves of each air-pump of the engines shown in fig. 2, one on each side, though it perhaps might have been better to have put those doors on the ends of the condensers.

By proportioning the weight and the velocity of certain of the moving parts of the engine to the pressure of the steam on the piston, and the degree of expansion so that the excess over the mean pressure of the steam in the cylinder at the beginning of the strokes will produce an amount of momentum in those moving parts which will be expended in assisting the expanded steam, the pressure on the crank-pin may be rendered uniform, or nearly so; and thus the motion of the crank-shaft and the strain on the crank-pin may be made so uniform that an engine worked expansively will not be more subject to irregularity of motion than a non-expansive engine of the usual form and proportions; for example, if in the kind of engine represented in fig. 3, the piston and the other moveable parts which conduct the motion of the piston to the crank-pin were very light, the pressure on the crank-pin would vary nearly as the pressure in the cylinder; but if the weight of the piston is increased so much that it will take an amount of pressure about equal to the excess of the initial above the mean pressure in the cylinder to impart and maintain the variable increasing velocity of the piston and the pieces which transmit its motion to the crank-pin to the extent required during the time the crank makes, say one-fourth of a revolution from either of the positions it is in when the piston has completed its stroke; and if in this position of the crank the steam has attained its mean pressure, it is evident that as the excess above the mean of the steam pressure has been spent in imparting motion to the piston and the moving parts which connect it with the crank-pin, that pin must have been actuated during the time by an uniform, or nearly uniform force, equal to the mean pressure of the steam in the cylinder. And, on the principle now explained, as the momentum of the piston and that of the parts which conduct its motion to the crank-pin must be expended by the time the piston reaches the end of the cylinder; and as this momentum is produced by or corresponds to the work of the initial over the mean pressure of the steam, it, to the required extent, along with the pressure of the attenuated steam, will maintain somewhere about the same uniform pressure before-named on the crank-pin; and thus the pressure on that pin will be rendered uniform, or nearly so, during the whole of the stroke.

If all the weight required could be put on the piston, and the moving parts which transmit the motion of the piston to the crank-pin had no weight, an uniform pressure, the same as that on the crank-pin, would be on the connecting-rod, the gudgeon the connecting-rod works on at the end of the sway-beam, the main centre, the gudgeons of the crosshead which connects the two piston-rods, the sway-beam, and the piston-rods. This makes it evident that as much as possible of the weight spoken of should be put on the

piston, or near it, as it is of great importance to have as little more than the mean steam pressure as can be got on the parts enumerated, in order that they may be made as light as possible; and the diameter of the gudgeons, and consequently the loss of power from friction on them, may be a minimum.

It will now be seen that if extra weight is required, all the secret is in the placing of it properly; and if this be attended to, engines like those represented by figs. 1, 2, and 3 may be worked expansively to great advantage. The weight of the piston and that of the moving parts betwixt it and the main centre of vertical cylinder engines should be exactly balanced by the weight of the connecting-rod end of the beam and that of the crank and connecting-rod; and this, to some slight extent, may prevent the whole of any extra weight that may be required for carrying out the expansive action of the steam to the greatest advantage from being applied to engines of the kind named in the best possible manner. In a case of this kind, if extra weight is required, place as much of it as can be got on the piston, and the rest on the connecting-rod end of the sway-beam. The short stroke of the new engine, and the small portion of time it takes to make half a revolution, render the use of a very heavy extra weight unnecessary to take advantage of the expansive principle properly; and in some cases no additional weight will be required when that kind of engine is used as the motor.

If one of the new engines were used for actuating a centrifugal pump of the kind manufactured by Messrs. Gwynne and Co., London, a corn-mill, or other like work requiring a high and uniform speed, the expansive action of the steam could, on the principle above explained, be carried out with a fly-wheel of no greater weight than is used for a non-expansive engine.

The expansive principle explained may also be applied to engines having the stroke of the piston of the usual length, though that kind of engine is not so well suited for this as the new engine. The engine shown in fig. 3 is perhaps as well adapted for taking advantage of the expansive action of the steam as any other, and the reason why it is so will be obvious enough.

The engines represented in figs. 1, 2, and 3, being for screw steam-ships, have not the best forms for the other kinds of work enumerated in the heading to this letter; but this does not matter much, as any one acquainted with the subject will, from what has been said, be able to fix upon the form that should be used.

An explanation plain enough, though it may not be altogether correct, of the proper method of working the steam expansively, has been given, and if in other respects the nature of the new engine has been described so far as to show that it will cost less than the old, with toothed wheels, and that, independent of the economy connected with the expansive action of the steam, 12 to 15 per cent., and in some cases more, of the price of coals required to maintain the power may be saved, and if, in addition, it has been made out that the new has other important advantages over any form of the old engine, the expectations entertained when this letter was commenced will be realized.

In Jarrow Chemical Works, South Shields, Newcastle, a high-pressure steam engine on the new principle has worked well for more than a year. 26 inches is the diameter of the cylinder, 2¼ feet the length of the stroke, 2 feet the length of the crank, and 50 revolutions per minute the speed of the crank-shaft. At first it was thought that more than 50 revolutions of the crank-shaft per minute would be required for driving direct from it certain parts of the patent cooperage machinery the engine keeps in motion; but as afterwards it was ascertained that 50 revolutions would be about right, the speed of the crank-shaft was reduced to this.

I am, Sir, yours, &c.,

JAMES WHITELAW.

13, Ronald-street, Glasgow, March 28, 1854.

PROPORTIONS OF LOCOMOTIVE BOILERS.

BY ZERAH COLBURN.

(*Concluded from page 293*).

The next important element in the proportions of the furnace is the opening of the tube mouths, or of the thimbles which tighten them in their places. From an internal diameter of 2 inches this opening has been reduced to 1¼ inch, the former size being that allowed in Stephenson's early engines, and the latter having been adopted in some of the heaviest engines built by Rogers, Ketchum, and Grosvenor. This contraction attends the reduction in the diameter of the tubes, made for the purpose of obtaining greater heating surface, and is partly due to the increased thickness of thimbles of cast iron, as compared with wrought iron, or as, in earlier times, none

at all. If the greatest extent of absorbent surface was not an object with a given size of boiler, it would be better if the opening for the escape of heated air were in one large flue.

The processes of combustion and of evaporation are, in some respects, alike; and it is believed that the resemblance may be recognised sufficiently to perceive the importance of rapid draft. In combustion, the elements are carbon and oxygen; in evaporation, commonly speaking, the elements are heat and water. In each case, one of the elements is a palpable physical substance, the other an invisible gas. The want of either wood or water would, of course, suspend one or both of the operations. If steam is rapidly worked from a boiler, the rate of evaporation is increased. If the steam pipe be throttled, however, the pressure will rise but slowly, and the rate of evaporation will be diminished. Now, the comparison in the process of combustion is this:—If the carbon of the fuel be thoroughly and rapidly oxydized, or, what is the same, if the *products* of combustion were rapidly carried off, whether imparted to the water or wasted, and room be as quickly made for more, a larger *amount* of heat would be generated. If the tube openings, however, by their undue contraction, throttled the draft, the presence of the products of combustion within the furnace would retard the oxydation of more carbon. In the case of evaporation, the accumulated pressure of steam above the water level would be a mechanical obstacle to further production, while in combustion the accumulated products would exert a chemical preventive to further oxydation.

Especially is an increase of diameter of tubes required where these, from any cause, are extended to an unusual length. The friction surface being increased by lengthening the tube, as well as increasing the amount of air to be forced out, or the back pressure, the tube should be enlarged in diameter, to take up sufficient heated air to insure a rapid draft.

With any ordinary contraction tubes, it is possible to get a sufficiently rapid rate of combustion by narrowing the blast pipes; but this imposes a direct load upon the working of the engine.

The effect of contracted tubes may be readily inferred. Rapid evaporation can be had only by a rapid communication of heat to all parts of the water. The small tube, under an ordinary draft, takes up a quantity of heat which becomes quickly absorbed, to an extent that reduces the escaping gases to a temperature below any heating efficiency. The result is the same as if a large portion of the "heating surface" were taken away. Sufficient heat does not reach the forward portion of the tube surface to impart any elevation of temperature to the water already under the action of the first portion of the tubes. The forward ends of the tubes are, therefore, of little value, and might nearly as well be dispensed with; while, simply, by furnishing the required heat, they could be readily brought into effective use. To supply an abundance of steam of a high pressure, a great amount of heat must necessarily be applied, and some heat must be wasted; but in proportion to the intensity of the fire in the furnace, the less is the *relative* loss. Hence, small grates, under a good draft, are most economical in their consumption of fuel. The available or useful heating quality of any temperature is the difference between it and that of the object to be heated; and this is the reason why there is greater economy in a rapid draft and intense fire. To maintain such fires, however, without injuring the boiler, either thin iron of the best quality must be used, or else the best description of copper. The water spaces must also be wide, and the sheets incline outwards from the space on each side in approaching the top.

It is not unworthy of the subject to compare the early engines, built by Stephenson and other cotemporary builders, with those of the present day. Besides the great difference in the relative proportions of furnaces, already noticed, the tube opening was one-fifth of the entire grate area, where it is now from but one-tenth to one-fifteenth. The tubes were three and a-half times the length of the furnace, while now the distance is from two and a half to three times. The little boilers of former times were notorious for their steaming powers. For a given capacity of cylinder, it is true that they had slightly more boiler capacity and heating surface than is now given; but they had the countervailing disadvantage of the want of expansive gear. Many of our present heavy express engines, with nearly an equal proportion of heating surface to a given capacity of cylinder, are, with the most perfect expansive apparatus, well known to be short of steam.

The practical means of widening the furnace, within certain limits, are the use of the thin edge-frame on the sides of the fire-box, and such suspension of the springs as will not interfere between the wheels and furnace. The spring of the back driving-axle will, probably, require to be hung transversely across the engine; with which arrangement the equalizing levers can be kept much as at present. The trailing-wheels of English engines have their springs hung across the engine, to permit of the use

of the thin frame. I look upon 43 inches as the greatest width of furnace attainable within the narrow gauge and with inside framing.

To obtain greater width of tube opening, the best means are in the use of iron tubes, of the best quality, and the entire omission of thimbles. The coal-engines built by Winans and by Baldwin, having tubes and furnaces entirely of iron, furnished in Philadelphia, are found to stand the severe action of anthracite, and when well set give no trouble in respect to caking. The coal-burning engines built by Winans have 2¼ inch tubes for 14 feet length.

Another means of improving the working of locomotive boilers, is in forming a better connexion of the tubes and chimney than is afforded by the ordinary "smoke-box." The direction of this passage must be eased, and its contents reduced to the smallest practicable extent. The use to which the upper part of the smoke-box is generally placed has prevented the separation of that part from the general contents of this chamber. The steam-pipes and throttle-box, for the want of a better situation, have been placed here, and often in such a manner as to stand in the way of the draft. A plan, which I proposed some time since, for the relief of the draft of engines, on a line having low bridges,—which plan, I have lately learned, was tried with good results some years since on the Columbia-road, but for some reason was not continued in use,—was to place a level sheet of iron across the smoke-box, just above the upper row of tubes. This would reduce the contents of the smoke-box, and, consequently, the amount of air to be lifted out. It would allow of extending the chimney downwards, and of thereby increasing its effective length, and also of lowering the blast-pipes, and substituting blast-pressure for blast-suction. I look to this plan as one likely to become generally applied.—*Journal of the Franklin Institute.*

RUTHVEN'S PROPELLER. — CONSUMPTION OF SMOKE.

At the meeting of the Institution of Civil Engineers on April 4, 1854, after the reading of the minutes of the last meeting, it was observed that the statements in the paper on Ruthven's propeller had been misunderstood, as it had been assumed that the paper stated the useful effect realised as 64 per cent. of the whole power of the engine at the pistons, whereas it was really stated to be 50 per cent., and that the useful effect was 64 per cent. of the power delivered to the wheel-shaft, which would materially affect the deductions then made.

That one most important element in the calculation was lost sight of, namely, the duplicate pressure of reaction due to the efflux of water through the side of a vessel at rest; the whole unbalanced hydraulic pressure being twice the hydrostatic pressure due to the height of the column of water. It was contended that this duplicate pressure must exist to some extent, so long as the effluent velocity of the water exceeded the receding velocity of the vessel; and that it diminished in some ratio with the receding speed of the vessel and vanished only when the vessel had acquired the effluent velocity of the water—when the simple pressure, due to the head of the water, remained. Therefore, that some allowance must be made for this duplicate pressure; and that, assuming it to decrease uniformly with the difference of speeds, the power would be thus estimated when the speed of the vessel was 62 per cent. of that of the effluent water, leaving 38 per cent. of excess;

$1 \times 100 = 100$ per cent. when the speed of the vessel was equal to that of the effluent water;

$1{\cdot}38 \times 62 = 85{\cdot}56$ per cent. when the speed of the vessel was 62 per cent. of that of the effluent water;

Leaving 14·44 per cent. of loss, by excess of speed, as originally deduced in the paper.

It was added, that the proportion of the useful effect would be more simply estimated in the ratio of the squares of the speeds, as was done in the paper, thus:

$$100^2 : 38^2 :: 100 : 14{\cdot}4 \text{ per cent.}$$

The proposition of the power employed was reduced nearly to common algebra, by separating the various causes and effects: the useful effect, in proportion to the power employed, was shown to be a maximum, when the speed of the boat was equal to the velocity of the effluent water, the "vena contracta" being taken into consideration. The ratio of useful effect to power employed was shown to be $\frac{2N}{N^2+1}$ The velocity of the effluent water being to the velocity of the boat as N to 1.

It also appeared, that taking the sum of the useful effect, that is, in driving the boat, added to the effect not so employed, or wasted, was in all cases equal to the power employed, it was of no importance, theoretically speaking, whether the water was pumped up from the bow, the sides, or the bottom.

The subject was investigated in three different ways, each giving the same result.

It was stated, that in 1848 Mr. Purkis,

being engaged in the construction of a fan-blower, thought the same principle might be adapted to the propulsion of a boat, and tried it in a model, about 4 feet long and 8 inches wide, with a small steam-engine and two fans, each 2 inches in diameter; with this he attained a speed of 3 to 4 miles per hour. He then built another boat 25 feet long, and 4 feet wide, fitted with an engine with two cylinders, 4 inches diameter and 4½ inches stroke, driving two fans, 12 inches diameter, of the same form as the fans of Appold's pump; the water issuing from two orifices, each of 25 square inches. With this apparatus, the boat could only hold her way against a tide of about three miles an hour. On the substitution of two fans of 7 inches diameter, and the reduction of the propelling orifices to 7·75 square ins. each, the boat attained an estimated speed of nearly eight miles an hour. It was admitted that these experiments were imperfect, but they tended to corroborate the statements of the performances of Ruthven's propeller.

The arrangement of Purkis' boat differed from Ruthven's chiefly in there being three holes on each side of the vessel—one to propel her head, one astern, and one midship to supply the pump—each being supplied with a valve to close the orifices not in action, and to act instead of the curved nozzles of the *Enterprize*, which were supposed to be objectional in absorbing power.

The first paper read was "On the Prevention of Smoke in Engine and other Furnaces," by Mr. James Simpson, jun.

In the paper it was stated that the alleged saving of fuel effected by the various mechanical apparatuses proposed for ensuring the prevention of smoke, depended chiefly on the manner of stoking, and that it might be attained by a judicious modification of the grate of any well-set boiler, and by a greater amount of attention on the part of the fireman, without any mechanical appliances.

The regulation of the air supply by machinery had been found to fail in many instances, on account of the variation in the qualities of the fuel, and it was contended that it was more advisable to entrust it to the discretion of the fireman, than to rely upon self-acting apparatus, which might, however, be advantageously used for indicating the state of the furnace.

The employment of Anthracite and Welsh steam coal was advocated, not only on account of the absence of opaque smoke during their combustion, but also on the ground of the economy arising from their great evaporative power.

The second paper was "On the Management of Furnaces, and the Prevention of Smoke," by Mr. C. Wye Williams, Assoc. Inst. C.E.

The object of this communication was to endeavour to remove the mystery which had hitherto obscured what was asserted to be one of the simplest and best understood processes of nature, namely, the combustion of the gaseous products of coal. A short analysis of the chemical details connected with the subject was given, to show that the existence of flame did not imply the combustion of gas. That it was but the preliminary state of high temperature of the numerous atoms of the carbon of the gas, which was caused by the intense heat, produced by the combustion of the other constituent—the hydrogen.

In effecting the combustion of the gas generated from the coal in a furnace, the first process was merely mechanical, and consisted in bringing the atoms of the gas, and those of the air, into the most intimate state of mixture; such mixture being the "sine quâ non" of subsequent chemical union. The mode or means by which this chemical admixture could be effected, in the most rapid and intimate manner, involved all that art or human ingenuity could do towards producing perfect combustion.

As to the mode of effecting this mixture, or of bringing together the atoms of air and gas, reference was made to the Argand gas burner as supplying a good illustration; the only difference being, that in the Argand burner, the gas was projected among the air in numerous small jets or films; whereas, in the furnace, the process was reversed, the air being brought to the gas, in a similar manner, by means of numerous orifices.

In both cases the effect was identical, and might be compared to the rose of a watering pot, or of an artificial "jet d'eau;"—namely, the producing, on the instant, the largest area of surface for mutual and atomic contact. Models and drawings were exhibited, showing the facility and simplicity with which, both in land and marine furnaces, hundreds of small orifices were introduced, so as to effect the most intimate mingling of the air with the gaseous products of combustion.

It was stated, as the result of considerable experience that it was a matter of perfect indifference in what part of a furnace or flue the air was introduced, provided this all-important condition was attended to and satisfied, namely, the effecting the mixture of the air and the gas before the temperature of the latter was reduced below that of accension or kindling. This, according to Sir Humphrey Davy, should not be under 800°, Faht., as ignition could not take

place at a lower temperature,—that fact being the principle of safety in the miner's lamp.

Previously to the introduction of the tubular, in place of the flue system, in marine boilers, it had been supposed that the introduction of the air, on the Argand principle, by a perforated plate behind the bridge, satisfied all that nature required in producing perfect combustion. The tubular form of boiler, however, rendered a different arrangement absolutely necessary. This was occasioned by the run or distance between the bridge and the tubes being so very short, and, consequently, the passing along that distance being so limited in time, that the mixing and combustion could not be adequately effected. This, after numerous trials and expedients, led to placing the orifices of admission in the front, or at the door-way end of the furnace. The system adopted by boiler makers of contracting the door-ways of marine boilers, much impeded a successful application of the Argand principle. The enlarging the door-way opening, as shown in the models, however, afforded sufficient space for the required number of ¾ or ½-inch orifices. By this arrangement, the length of the furnace, from the door to the bridge, was thus, as it were, added to the length of the run. By this mode of construction, the Argand principle had been applied with great success to marine boilers.

The next point considered was, as to the quantity, or gross volume of air required, and the area of aperture necessary for its introduction. On this head, it was stated that a great practical error had been frequently committed, as it had been stated, that it would suffice, if the aperture should be equal to 1¼ square inches for each square foot of fire surface in the furnace, in the case of single furnaces; and of but half a square inch, or ·5-inch for each square foot of grate-bar surface, in the case of double furnaced boilers.

These proportions were now asserted to be wholly insufficient, and, in fact, were not sufficient to allow of one-fourth the required quantity of air to pass. In practise it had been ascertained, that for bituminous coal from 4 to 6 square inches were required for each square foot of furnace; and for anthracite, from 2 to 4 square inches, according to the quality of the coals and the amount of draught. The models and drawings exhibited were stated to be conformable to those proportions.

With reference to the supposed necessity for skilful firemen, the paper stated, that the only duty that should be required from the firemen was, the keeping the bars fully and uniformly covered; for if the back end, or the sides of a furnace, were left uncovered, the air would pass through them instead of passing through the air distributors, as that passage offered the hottest and shortest route to the chimney. In fact, it was stated, that unless the bars were well and equally covered, it was impossible to regulate or to control the admission of the air.

As to the use of self-acting valves to regulate the admission of the air, it was stated, that after numerous plans had been tried during the last ten years all had been discarded in practise, being found to be worse than useless. The generation of the gas, and the admission of the air through the uncovered portion of the bars, created such irregularity as to defeat all efforts at uniformity, and it was impossible, by any self-acting valves, to obviate the effects of such irregularity. It was observed, that the pyrometer, a model of which was exhibited in action, proved the inapplicability of such valves, and furnished the only reliable test as to the quantity of heat produced and properly applied in the generation of steam. It was also observed, that the colour of the products of the furnace at the chimney-top was but a source of error, the sight-holes and pyrometer supplying all that was necessary, and by which the firemen could alone safely and practically regulate the admission of air.

CAPTAIN CARPENTER'S "SCREW PROPELLER" PATENT.

BEFORE THE JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

Present—The Right Honourables Lord Justice Knight Bruce — Lord Justice Turner—Sir Edward Ryan—Sir J. Dodson, and Sir John Patteson.

Mr. Vance appeared in support of the petition of Captain Edward John Carpenter, R.N., who prayed for an extension of his patent, dated the 13th day of June, 1840.

The grounds on which Captain Carpenter urged his claims for a prolongation of the original term of fourteen years were as follows:

1stly. That Captain Carpenter is the original inventor and patentee of the screw propeller in use in all Her Majesty's ships and vessels of war at this present day, and that his invention has been in use for some time in the Royal Navy.

2ndly. That the invention was novel at the date of his patent, that it had been duly patented according to law, that it had been of great utility and great value to the Admiralty.

3rdly. That the instrument called the "screw propeller" was adopted in the Royal Navy in consequence of the discoveries made by means of Captain Carpenter's experiments, which were conducted at his own expense, and shown to the Admiralty.

4thly. That Captain Carpenter has received no benefit whatever from his invention, although a sum of £20,000 had been paid into a private banker's hands in the City by the Admiralty, on behalf of all persons who could substantiate a claim to patent right in respect of the screw propeller used in Her Majesty's service.

The Attorney-General, Sir A. Cockburn, appeared for the Admiralty and the Government, and stated that he would withdraw his opposition to the petition, provided Captain Carpenter would consent to the introduction into the extension of a clause, prohibiting him from making any claims on the Admiralty for the future use of his patent, which plan had been followed by other patentees.

Mr. Vance, on behalf of Captain Carpenter, refused to accept the condition which the Attorney-General wished to impose upon him.

The case was argued at great length. The Right Honourable Lowry Corry, one of the Lords of the Admiralty, during the time the invention of the screw propeller was first adopted in the Royal Navy; Sir Edward Parry, Comptroller-General of the Steam Department of the Navy, also at the same period; Mr. Lloyd, Chief Engineer at Somerset House; Mr. Ellis, manufacturer of the screw propeller, Woolwich Dockyard, for Her Majesty's ships; Mr. Longbottom, Secretary of the Royal Polytechnic Institution; Dr. Sayer, Mr. Galloway (engineer), Mr. Durrant, and Captain Carpenter were examined as witnesses to prove the petitioner's case.

After hearing the Attorney-General, who contended that as Captain Carpenter had asked Mr. Currie to pay him the £20,000, that it amounted to his admitting him to be the contractor, and also insisted on the insertion of the condition giving the Admiralty the benefit of his invention, Lord Justice Knight Bruce, on behalf of the Committee, gave judgment as follows:

In this case there are great difficulties in the way of the applicant, arising from the limited extent to which, unless, perhaps, by the possible exception in the Royal Navy—the limited extent with that possible exception—to which the invention, the subject of this patent, has been brought into use, and the very limited endeavours that have been made on the part of the patentee to bring it into use. To which must be added an absence of detailed accounts, or, indeed, of any accounts, such as has been very unusual. Their Lordships are of opinion, that in the very particular circumstances of the present case, each of those apparent objections is answered. And they are particularly struck by the circumstance that the *Admiralty—the Government—having had notice of the present application, and appearing here by the Attorney-General, must be taken not only as not contesting the validity of the patent—not only as not contesting the utility and value of the invention, but as, in effect, conceding, as indeed has been proved at the bar, that this very invention is in use at this day, and has for some time been in use in the Royal Navy.* There is but one circumstance more to which it is necessary to advert, that is, the payment of a large sum of money by the Admiralty, as it appears, into the hands of a gentleman, a banker, it seems, in the City, named Currie, for the purpose of application to or among the supposed inventors of the screw. It appears, however, that that sum is not *now* in the hands of Mr. Currie, but has been paid to various persons, not including the present claimant, who has had no benefit whatever from it; Mr. Currie having, it seems, considered that other parties had a better claim than this gentleman; and, in point of fact, that this gentleman had none.

Now, that circumstance might be of importance if this gentleman had ever accepted *Mr. Currie* as his *judge* or *arbitrator*, or had ever agreed to leave to him the truth or merits of his invention. This gentleman, however, never has done so. Of course, he was willing to obtain the £20,000 from Mr. Currie, or from any other quarter that the Admiralty might think fit, if he could obtain it; but his application for it cannot be construed into a submission to the reference of his rights to the decision of Mr. Currie or any other person.

His case, therefore, in their Lordships' opinion, is not at all prejudiced by what has taken place in that respect. And under all the particular and almost unexampled circumstances of this individual case, their Lordships are of opinion that the ends of *justice* will be answered by extending this gentleman's patent for a period of six years unconditionally.

MONUMENT TO GEORGE STEPHENSON.

Without much ceremonial observance, and in the presence only of the more active members of the committee formed for the purpose, the colossal marble statue of the late George Stephenson, upon which Mr. Baily, the sculptor, has for some time past been

engaged, was yesterday uncovered in the great hall at Euston-square station. Mr. Geach, Mr. Scott Russell, Mr. Manby, Mr. M'Connell, Mr. Hodgkinson, Mr. Chas. Stewart, Capt. Huish, and half a dozen other gentlemen were in attendance, and took off their hats as the figure of the great railway engineer stood revealed before them. Mr. Geach spoke a few words explanatory of the circumstances under which the memorial of the deceased had been got up, and of his claims to such a mark of respect and admiration. He explained that the idea had originated with the Society of Mechanical Engineers, of which George Stephenson was the founder; that the mere advertisement of the fact had been sufficient to collect all the money requisite for the object in view; that the subscriptions included an average of 2s. from 3,150 working men, and that 178 private friends had contributed an average of £14 each. Mr. Scott Russell added some well-merited compliments to the artist for having executed a statue conveying so truthful and yet so grand an idea of the original. His opinion was confirmed by one of the directors of the company who was present, and will be sanctioned by the verdict of the thousands who from day to day, on their way from the metropolis, will have to pass through the hall. When Mr. Baily had expressed his thanks, the proceedings of this simple inauguration terminated, and with it, probably, all that will be publicly done by his contemporaries to celebrate the achievements of a man who stands more nearly and intimately associated with the spirit of the 19th century than we are yet willing to recognize. George Stephenson's life possesses an interest of the highest order, and will, no doubt, some day claim a worthy record. In early life a collier, working for his daily bread in the bowels of the earth, he mended watches in his leisure hours that his son might have the blessings of education. While his fame as a mechanical and civil engineer was still in its infancy, he elaborated experimentally the same results as to the safety-lamp which Sir Humphrey Davy reached by the process of philosophic induction. The tramways of the coal-mines and the rude forms of the first locomotive engines, grew under the strokes of his vigorous intellect into a mighty system, which has already exercised an incalculable influence upon industry and civilization. That one who, when a boy, was a "hurrier" in a coal-pit, should, by the force of native genius, rise to a position such as that which the statue in the hall of Euston Station commemorates, may well be regarded as a proof that the days of romance are not yet over, nor the giants of an elder world without their types in modern times. Perhaps it is also to be viewed as a characteristic of the age, that the fame of such a man is so quietly left to the good keeping of the works which he has achieved. The traveller hastening on his way should pause in Euston Station to contemplate the masculine form and massive, energetic features of him who, by combining the blast-pipe with the tubular boiler, first endowed the locomotive with its tremendous speed—who during his busy manhood superintended the construction of more than 2,500 miles of railway—who thought out everything connected with our first iron highways, and who engineered lines extending in unbroken series from London to Edinburgh. Mr. Baily has risen to the level of the subject thus given him to embody. His statue is executed after the painting by Lucas of Stephenson standing on Chatmoss, the site of one of his greatest achievements. It is simple and yet grand in treatment, and will, we doubt not, be universally recognized as one of the most successful productions of the English school of sculpture.—*Times.*

MONUMENT TO WATT.

A proposal has been made at Greenock to have a great pile or cairn, as it were, of stones put together, as a monument to James Watt, and to afford to the whole world an opportunity of contributing to the testimonial, by inviting every admirer of Watt to furnish a portion of the materials of which the monument would be composed—whether freestone, granite, or marble. Some of the proprietors of Renfrewshire quarries have already offered contributions to the work; but till a considerable mass of materials is laid down, it seems to be resolved not to decide what particular form it shall assume.

THE DECIMAL SYSTEM.

At a recent meeting of the Institution of Civil Engineers, during a further discussion on Mr. Yates's paper, it was related that, at about the period of the introduction of the sovereign to supersede the guinea, when Mr. Babbage was considering the details of the machine for calculating tables by difference, he essayed every other system, but was obliged to return to decimals; this turned his attention to the means of adapting the English coinage to a decimal scale. His proposition was to accomplish the end gradually, by the introduction of a silver coin of the value of two shillings as the unit, calling it a "Prince." Then, after a time, to divide

the pound sterling into one thousand farthings; other proportional new coins being gradually introduced as the old coins were withdrawn. The question of the most convenient coins for commercial purposes was entirely apart from establishing the decimal system. These views were repeatedly, but ineffectually impressed on the government of the day; but the only publicity given to Mr. Babbage's views was in the second edition of "The Economy of Manufactures," in 1832. The delay in adopting some scheme of the kind had permitted the issue of nearly eleven millions and a half of half-crown pieces, and so far had interposed greater difficulty in the substitution of decimal coins for those now in use.

It was proposed, as a means of aiding in familiarizing the public mind with decimal divisions, to have engraved on all thermometers the Centigrade as well as the Fahrenheit scale, so that in time the latter might be dropped, and the former be adopted.

It was contended, that for all practical purposes of commerce, and for professional and scientific calculations, it would be most convenient to take the sovereign as the integer, to divide it into shillings of the value of ten pence each, and the penny into five farthings; thus, in point of fact, the whole of the existing coinage would be brought, as nearly as was practically necessary, to a decimal system; and the present coins would be used until they were worn out, and they could be replaced by a new decimal currency.

The objection of the Astronomer Royal to the adoption of the mètre, as a standard of length, was contended to be valid; there was no advantage in obtaining a standard from astronomical and other observations; in fact, the present standard yard, as recognized by law, appeared to be sufficient for practical purposes. His proposition as to the chain and link was not, however, agreed to. On the contrary, it was argued that, by dividing the present foot into 10 inches, instead of 12 inches, and the inch into 10 parts, a scale which was familiar to all draughtsmen, and to many artizans, would be introduced, which would be easily understood and would soon be adopted. The foot would be divided into 100 parts, instead of into 96 parts; so that 1-10th might be substituted for 1-8th, with very slight disadvantage.

In which case the link of the measuring chain, instead of being represented by 7·92 inches, as at present, would be represented by 6·6 inches, which would be a very convenient proportion for calculation, and it would possess the additional convenience of enabling the superficial inches in a link to be represented by the same figures as those of the superficial feet in an acre; viz., 43·560 inches in one square link, and 43,560 square feet in one acre.

As to weight, all that could be required was, for the legislature to decree that it would recognise no conventional values for the cwt. or the ton; but that the cwt. should be represented by 100 lbs., and the ton by 2000 lbs., the stone being then 10 lbs. The lb. might, if necessary, be decimalised, as it was at present by the bullion dealers, for the special requirements of that commerce; but even without that, the chief facilities would be acquired, and practice would soon render the system familiar and convenient.

It was considered of great importance to retain the present denominations, especially for mental calculation, which was so much practised, from the smallest retail traffic up to the most important branches of commerce and financial transactions.

UNIFORM WEIGHTS, MEASURES, AND COINS.

To the Editor of the Mechanics' Magazine.

SIR,—Perhaps you will indulge me with a little space in your Magazine, for a few remarks, *à propos*, to a letter subscribed "A Collegian," which appeared in your last Number. The writer proposes an alteration in our present coinage, which he thinks "a well-considered improvement of our existing currency, as a prelude to the greater and more general scheme of reform in our scale of weights and measures." That it would be an improvement, I think, is an entire mistake; a prelude to improvement it certainly might be, and would, perhaps, be of use in rendering surprise at any change almost impossible; so that a really good system might be introduced, to the satisfaction of everybody. But this kind of change is, I think, not the best introduction to reform. I am not going to set forth any pet scheme of my own, Sir, for I am not in a position, and I have not the desire, to originate important reforms; but I may, perhaps, without presumption, give my opinion on the movements made by others, for the alleged benefit of my countrymen, or of the class to which I belong. I leave those to whom it is addressed to assign its intrinsic value. I will attempt, then, to dispose of the objections to the decimal scale, and of the arguments for the innovation advocated, as they occur in the letter.

First, then, as to the divisibility of the number 10 and its multiple, as compared with 12. It is true that out of the same consecutive numbers we shall find more

that will measure 12 and its multiples than will measure 10 and its multiples, because there will be more composed of 2 and 3 and their powers than of 2 and 5 and their powers. Now, this might have a little weight, perhaps, if sums of money were always expressed in round numbers — in single units of the scale; but as this is not the case, the claims of our scale as to this very unimportant consideration are about equal to those of the others; for some numbers will have the advantage in one scale, some in another; and in different scales, different numbers will have the same advantages. Results can always be made accurate to within the lowest coin in the currency; and as to a series of calculations being likely to increase any small difference arising in this way, I can only say that it will be the calculator's fault if it so happens. If we were to allow a consideration of this kind to influence us much, we ought to choose a number like $2 \times 3 \times 5 \times 7$, or 210. But the only important matter in connection with these fractions is, the degree of approximation with which we can always transform our calculation into current coins; this depends on the magnitude of the least in the coinage. All we have to do then is, to make this small enough; so that this objection is too refined to receive any respect from a practical man.

The only real objection to a decimal coinage is what "A Collegian" calls "the extreme difficulty of harmonizing it with our existing scale of weights and measures, and thus practically rendering the adoption of a general and uniform scheme of values, weights, and measures, almost morally impossible." This difficulty is, perhaps, not so extreme, for if we take (as would be most reasonable) the sovereign as our unit, all our silver coins, except the fourpenny piece (which is not a very convenient one) will harmonize perfectly with the decimal scale, the only departure necessary being in the penny. As to the persistence of the French in the use of the *sou*, I can only say that it is not very apparent why the advocates of the decimal system should desire its expulsion from the currency; a *sou* is equivalent to 5 *centimes*, or one half a *décime*, and a very useful coin, too, a coin to which we should require one to correspond if we had the decimal coinage introduced. There is no doubt but that its introduction would be a great improvement, and would soon be recognised as such by all. The increased spread of education will favour, and be favoured by, the change, and will enable the most humble to appreciate its advantages.

Next; to the proposal to divide the penny into five parts, and make this part the basis of some scale or other not very well defined, I can but say that it would be an unmitigated evil; it has not one single advantage over the present state of things. The aliquot parts of the number of vees which go to a sovereign is said to give it an advantage over the *mil;* but it has no advantage thus derived over either the *penny* or the *farthing*, for either the number 240 or 960 is as valuable in this respect as is 1,200. And the farthing has the advantage of being a much simpler aliquot part of a penny than the "vee." As to the rest of the properties of this division of the pound, they are such as every scale would have, and therefore say nothing whatever in its favour. In conclusion, Sir, allow me to say, that there can be no reason sufficiently strong to induce us to change our present system of coins, weights, and measures, except to obtain scales in which the various coins, &c., have the same ratio to one another as have the values of the same number consecutively placed in our scale of arithmetical notation, so that the same significant digits shall express values, weights, &c., in all denominations; and that the only objection to our present mode is, *that it does not do this*, that is, *that it is not a decimal scale.* Such are the opinions of

Sir, yours, &c.,

A Mechanic.

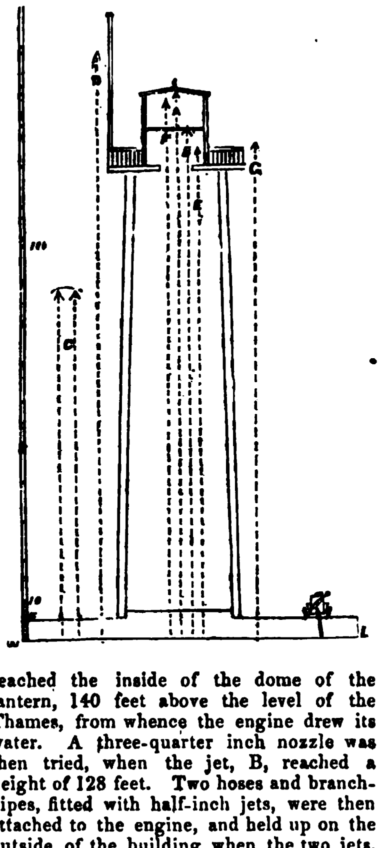
FIRE ENGINE EXPERIMENTS.

To the Editor of the Mechanics' Magazine.

Sir,—On Saturday, 18th March last, a series of highly interesting experiments on the capabilities of modern fire engines took place at the old shot tower in the Commercial-road, Lambeth, in the presence of Mr. Baylis, Secretary of the Unity Fire-office, Messrs. Tylers (at whose request the experiments were made), and several engineers and scientific gentlemen. The engine selected for these experiments was one named, "The London Pride," built by Messrs. Shand and Mason, upwards of five years ago, for the West of England Fire-office, during which period it has been doing the hardest work of metropolitan fires. The engine was worked by the West of England firemen and strangers (twenty-eight men), and the experiments were conducted by Mr. Connorton, Superintendent of Brigade to that office.

The results of these, as of all former trials, were just such as might be expected from an engine so significantly named. The character of these performances are conveniently illustrated by the accompanying

diagram, which is a sectional elevation of the shot tower, with the water-line, W L, height at which the engine was stationed, elevation of the jets, &c. In the first instance, a single jet $\frac{11}{16}$ths of an inch in diameter was affixed, and the branch-pipe placed perpendicular within the building, where it was screened from the wind; this jet, A,



reached the inside of the dome of the lantern, 140 feet above the level of the Thames, from whence the engine drew its water. A three-quarter inch nozzle was then tried, when the jet, B, reached a height of 128 feet. Two hoses and branch-pipes, fitted with half-inch jets, were then attached to the engine, and held up on the outside of the building, when the two jets, C, attained an elevation of eighty-seven feet. A single branch-pipe, equipped with the $\frac{11}{16}$th inch jet, was then tried, when the jet, D, was thrown nearly to the top of the flag-staff, that is, to the height of 150 feet above the level of supply; a performance, as regards height, never, I believe, exceeded by any engine worked by manual power. The greatest height to which water was thrown by Braithwaite's steam fire engine was only 120 feet;* and the horizontal range of Perry's large Canadian fire engine (Exhibition, 1851) worked by thirty-six men, was only 147 feet; *vide* "Jurors' Reports."

In November, 1850, two new fire engines, built for the London Fire Establishment, were tried at the shot tower, under the direction of Mr. Superintendent Braidwood; they were worked by two companies of soldiers, twenty-eight to each, and seven-eighths inch jets only were employed. One of these engines (D 26), built by Messrs. Shand and Mason, threw a seven-eighth inch jet, E, within the building to a height of 124 feet. The other engine (C 27), built by Mr. Merryweather, threw a jet, F, within the building to a height of 137 feet, and afterwards, on the outside of the building, another similar jet, G, to a height of 125 feet, the wind at the time blowing strongly. When the height and size of the jets are considered, these performances must be pronounced excellent. Each of the foregoing engines had two seven-inch barrels, the pistons having eight inches stroke; but the West of England engine has larger suction-pipes and passages than the others.

In a circular issued by Newsham towards the close of the 17th century he says, the fifth size of his fire engines, "hath play'd above the grasshopper upon the Royal Exchange; which is upwards of fifty-five yards high, and this in the presence of many thousand spectators."

Mr. Ewbank, in his treatise on Hydraulics, says, "Newsham was certainly mistaken," and gives the height of the jet as being fifty feet. It is quite certain, however, that if Newsham exaggerated the capabilities of his engines, Ewbank has underrated them to an equal extent. The jet from Newsham's engines is remarkably compact and steady, and I have frequently seen it attain a height of from eighty to ninety feet without any particular exertion on the part of the pumpers. "So perfect was his machine, that at the expiration of more than a century we still find it nearly as he left it. Various convenient alterations and improvements have in the course of this period been made in the details of this engine; but the general character and mode of construction adopted by Newsham have not yet been surpassed."†

I remain, Sir, yours respectfully,

WM. BADDELEY.

13, Angell-terrace, Islington, April 3, 1854.

FIRE EXTINCTION.—FIREMAN'S ELEVATOR.

To the Editor of the Mechanics' Magazine.

SIR,—I am sorry your correspondent

* *Mech. Mag.*, vol. xviii., pp. 2 and 170.

† "Engineers' and Mechanics' Encyclopædia," vol. i., p. 506.

"Homo" (page 325) does not perceive the fitness of fire-escapes for carrying up engine hoses at fires. The objections advanced by him against such an employment of these machines are, however, without foundation. "Homo" says, "the fire-escapes may be required for the purpose for which they were designed." This is their first and legitimate employment; but all such services are generally completed before the arrival of any fire-engine, and the machine is then available as a Fireman's Elevator. No difficulty whatever is experienced in managing the hose on the top of the escape, and the machine can always be so placed as to avoid the exposure of the men to needless peril. The experience of several years has shown no such deficiencies as "Homo" surmises; at the same time, if he has any improvements to offer, they will doubtless be acceptable.

"Homo" was evidently the victim of an optical delusion with respect to the engine being "quite incapable of forcing water through the opened windows in opposition to the flames that flared through them."

The same engine, at a trial a few days afterwards, threw a jet perpendicularly 150 feet high,* and therefore could hardly have failed to enter a window only seven yards distant. Besides which, the roof of the building in Wellington-street, having previously fallen in, the draught was *inwards* at the windows, and the water had no opposition to encounter. A spectator stationed in the Strand, as "Homo" was, would certainly be very unfavourably placed for observing the minutiæ of the fire extinguishing process.

I remain, Sir, yours respectfully,

WM. BADDELEY.

13, Angell-terrace, Islington, April 11, 1854.

* Particulars of these experiments have been already forwarded to you.

ASCENSION IN BALLOONS.

To the Editor of the Mechanics' Magazine.

SIR,—With your permission I would say a word or two in reply to the last letter of your correspondent "A." or rather to the only part of it which seems to mean anything. He says I have changed my opinion; I deny it: I am prepared to support not only what I stated in my last letter, but also what I stated in my first. There is no discord between them. I will restate my assertions here together, in order that "A." may not mistake me. I say, then, that the vertically resolved portion of the string's tension is the same always when the weight has either a constant vertical motion, or no vertical motion at all. Again, leaving out the variation in the density of the atmosphere and resistance, the motion of the weight will not alter the position of the common centre of gravity of the whole system; that is, if the weight move up, the other part must move down; and if the weight descend, the other must ascend. With this the rotary motion has nothing whatever to do; for the same thing happens if a person raises himself from the sitting to the standing posture, or *vice versâ;* or if the weight were raised or lowered vertically by means of a winch, or any other machine. As to the importance of the principle to aërostation, I quite agree with "A." that we need say nothing about it, as no practical use of the kind he has imagined can possibly be made of it. Let me assure him that the practice of assigning any effects whatever that he may desire to a phenomenon when he does not exactly understand it, is not always a safe one.

I cannot make my equation of moments more acceptable to any body who knows what such an equation is, by saying any more about it. I will, however, remark, that to take any equation of moments at all about C, we must assume the correctness of what I have before stated. While the vertical motion of the weight is accelerating, no equation of moments is allowable. Indeed, if there were a joint at C, the bar would revolve in a vertical plane through that point during the said acceleration.

"A." seems to imagine, that when a body is in motion it must always be acted on by a force in the direction of that motion. He says, the body "is always acted on by a force acting from the position that it started from." Nothing can be more absurd than this. Has "A." ever seen a cricket ball thrown into the air? Does he suppose that the force which brings it to the ground always acts in the direction of its motion? If it did, what reason could the ball give for changing that direction in such a peculiar way? I shall presume, that "A." has heard a little about the sun and the revolution of the earth about it: does "A." think the annual motion of the earth is in the direction of the sun's attraction? If he will answer yes, to these questions, I think his case is hopeless.

I should be much obliged, if, for the future, when he uses inverted commas he will really make quotations, and not mark his paraphrases of other people's composition in that way. I am, Sir, yours, &c.,

J. C.

Deptford, April 10, 1854.

EXPERIMENTS WITH FLOATING MODELS.

To the Editor of the Mechanics' Magazine.

Sir,—The statement of your correspondent, "N. B.," page 250, that on setting sail on two models of the *America*, that though the one with the reversed hull fell off from the wind, she went through the water with greater velocity than the other, appears to require the further explanation that has been promised, if required, and whether it is meant to be asserted, that with equal sail on the same course the reversed hull had the greater speed.

In the short relation of the experiment, it has not been kept free from possible errors of observation, whether the greater speed of the reversed hull was due to its form, or its being sailed more off the wind, so that I apprehend further proof will be deemed desirable. Another mode of measuring the resistances of such models, is by attaching them to the end of a beam, and shifting the draught until the two resistances are found to be equal, and then measuring the distance of the point of draught from the centre of the beam. In such cases it is desirable to ascertain if the ratio of resistances of two models varies at different velocities.

If this experiment could be tried, the publication of the result in the *Mechanics' Magazine* would at least oblige one of your readers, especially if the models were ballasted on a keel of 15° during trial, to represent the form assumed by vessels under canvass. However, an accurate relation of the experiment can alone be asked for.

Your obedient servant,

April 4, 1854. N. S.

ELECTRO-MAGNETIC ENGINES.

To the Editor of the Mechanics' Magazine.

Sir,—Your correspondent, Mr. Sewell, who has given a diagram of an electromotive engine in your last Number, would confer a favour on me, and I dare say others, if he would give a plan of an electro-motive engine calculated to work the bellows of a chamber organ; could the engine he describes be applied to this purpose? If so, what would be its probable size and cost? How many magnets would be necessary, and what length of coil and size of wire would be required for each of them? How is the noise prevented which must arise when the discs on the beam come into contact with magnets? In the case of my own organ, the weight to be overcome at each stroke of the feeder of the bellows would be about 25 or 30 lbs., and the length of stroke would be about 6 inches. The feeder is a double one. Any practical hints on the above subject from your correspondents will much oblige,

Yours, Sir, respectfully,

N. S. Heineken.

Sidmouth, April 5, 1854.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Gibbs, Joseph, of Abingdon-street, Westminster, civil engineer. *Improvements in the treatment of minerals for the purpose of separating impurities therefrom.* Patent dated September 20, 1853. (No. 2185.)

This invention consists in separating the impurities from coals and other minerals, where such are of greater specific gravity than the minerals themselves, by means of a washing machine, in which the flow of an upward current of water, through a receiving vessel, is employed to carry over the coals and light minerals, while the heavy impurities sink to the bottom of the vessel, and are removed by a current of water directed down against them, a sluice having been opened in the bottom of the vessel to allow them to escape. The material to be treated must be first rough ground to a coarse powder by a crushing mill or other contrivance, and then sifted into parcels containing fragments of as nearly equal size as possible.

Peabody, George, of Warnford-court, London, merchant. *Improved machinery for dressing and warping yarns.* (A communication.) Patent dated September 21, 1853. (No. 2186.)

Claims.—1. An arrangement of machinery for warping and dressing yarns directly from spools or bobbins, instead of from the large section-beams heretofore used, and for securing a uniform tension on the yarns as they are wound upon sectional loom-beams; while increased facilities for readily producing a variety in the stripe of the fabric are afforded. 2. Forming the loom-beam of sectional pieces, which, when arranged side by side, form the entire beam, by which arrangement the length of the loom-beam can be varied, and a variety in the stripes in the fabric can be produced by simply varying the relative positions of the sectional loom-beams in the loom. 3. The construction and application of a fan-cylinder, which is composed of slats arranged with spaces between them, and having the yarns passed round them, revolving fan-blades being placed within the cylinder, and caused to revolve independently of and at a more rapid rate than the slatted cylinder, by which means a large portion of the

yarn surface is kept in a gentle current of air, and the drying operation is rapidly effected.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved method of forming seams and ornamental stitching, and in machinery for effecting such operation, part of which machinery is applicable to the forming of other seams and stitches.* (A communication.) Patent dated September 21, 1853. (No. 2187.)

The primary feature of this invention consists in a method of forming seams with a single thread.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved mode of constructing steam boilers, applicable also in part to the construction of condensers.* (A communication.) Patent dated September 21, 1853. (No. 2188.)

This invention consists in the construction of boilers and condensers "with continuous straight or angular spaces, forming alternately in the boiler a water-flue and a fire or heating-flue, and in the condenser alternately a water space and a steam space. These may in their cross section be two, three, or more inches in the clear at the extreme breadth, and run to a point; or they may be flatted or rounded at the end to one or more inches or parts of an inch, and they may be one, two, three, or more feet deep."

CALVERT, FREDERICK CRACE, of Manchester, analytical chemist. *Certain improved processes for separating emery from other matters.* Patent dated September 22, 1853. (No. 2191.)

The patentee describes several methods of removing oils and other impurities from emery, without diminishing its hardness. This is effected, in one of these methods, "by boiling it with a solution of caustic alkalies or their carbonates, or other metallic oxides, such as those of lime, baryta, strontia;" but the patentee prefers employing a solution of caustic soda of a specific gravity of 0,015, the strength and quantity to be used varying, of course, with the quantity of oils or fatty matter which the impure spent emery contains. To facilitate the action of the alkali on the fatty matters, the whole is placed in a cast-iron boiler, and whilst being heated, either by steam or by the direct application of fire, the mass is kept in a constant motion by an apparatus consisting of a revolving perpendicular shaft, having an arm or arms projecting horizontally from it, or by some other agitator producing the same results. When the saponification is accomplished, the soapy liquor is run into a separate vessel, where it is mixed with a sufficient amount of acid to separate the fatty acids, which are then washed, and may be used for various purposes. A stream of water is then introduced into the vessel containing the emery, the agitator being all the time kept in motion, and, owing to the high specific gravity of the emery, the greatest portion of the impurities mixed with it are washed away.

ARROWSMITH, PETER ROTHWELL, of Bolton-le-Moors, Lancaster, and JAMES NEWHOUSE, of the same place, overlooker. *Certain improvements in machines for spinning and doubling.* Patent dated September 22, 1853. (No. 2192.)

This invention consists in certain combinations of parts particularly applicable to hand-mules, for performing what is technically called the "backing-off motion," or unwinding the yarn that is coiled round the bare part of the spindle previous to the running-in of the carriage; the said combinations being partly applicable to self-acting mules, and to machines for doubling.

OLDFIELD, EDWARD, of the firm of Messrs. Oddy, Robinson, and Co., of Salford, Lancaster, machine-makers. *Certain improvements in machinery for spinning and doubling.* Patent dated September 22, 1853. (No. 2193.)

This invention consists in an improved combination of machinery composed of a break, disc, and click, for putting the winding-on motion of self-acting mules, and other machines of the same nature, into gear, whereby the winding-on chain is tightened, and the direction of motion of the winding-on barrel reversed in less time than in the usual mode of constructing such machines.

WALKER, THOMAS WEST, of Hanley, Stafford, potters' manager. *Certain improvements in the manufacture of crates made of wood for the use of potters.* Patent dated September 22, 1853. (No. 2194.)

This invention consists in boring or drilling the wood used for making potters' crates with the ordinary vertical and horizontal drills driven by steam power; in applying steam to soften and render the wood supple previous to crushing, bending, and twisting it; and in dressing the wood with the circular saw into the required form.

BENETFINK, SAMUEL ALEXANDER, of Cheapside, London, ironmonger. *An improved construction of coal-box.* Patent dated September 22, 1853. (No. 2196.)

Mr. Benetfink's coal-box is suspended by bearing-pins on a forked frame, which is either rigidly affixed to a foot or pedestal, or is capable of turning on a central pivot projecting vertically from the foot or pedestal, for the purpose of bringing round the mouth of the coal-box to the required posi-

tion. The mouth is closed by a hinged cover, which is to be thrown back when the coals are required to be removed from the box.

LEETCH, JAMES, of Birmingham, Warwick, gun-maker. *An improved method of constructing breech-loading fire-arms.* Patent dated September 23, 1853. (No. 2197.)

This invention consists in the construction of a moveable breech which contains the explosive charge, in one entire piece, separate from the barrel of the gun, so that when the gunpowder is ignited, the explosive power of the gases evolved is sustained by the breech equally upon all sides, and independent of the barrel, by which means the inventor proposes to obtain the same strength for resistance as is obtained in the ordinary gun.

ALEXANDER, CHARLES, of Albany-road, Camberwell, Surrey. *A certain manner of preparing marquetry and all other kinds of inlaid work in veneers of various thicknesses, and for fixing the same to walls and ceilings of whatever kind, and in or upon floors of wood, stone, or metal, and for rendering such floors water and fire-proof.* Patent dated September 23, 1853. (No. 2198.)

The inventor takes a piece of marquetry or a veneer of wood of the required thickness, and glues it upon coarse brown paper, canvas, or any other suitable material, which he afterwards covers with a solution of shell-lac, Burgundy pitch, or resin, dissolved in spirits of wine, spirits of turpentine, or in water mixed with borax, potash, or any other alkalis which will dissolve shell - lac. To render a floor inlaid in this manner fireproof, he introduces first under the planking of the floor upon which the marquetry is laid, a surface of slate, stone, or metal, or first forms the floor of one of these substances laid on metal girders, and covers it over by means of a brush with several coats of a solution formed by dissolving twelve ounces of gum animi or gum copal in two quarts of spirits of turpentine, and adding one gallon of linseed oil, four ounces of finely-powdered asbestors, and four ounces of finely-powdered alum.

VARVILL, ROBERT, of High-ouse-gate, York, wholesale ironmonger. *An improved mortising machine.* Patent dated September 23, 1853. (No. 2200.)

The leading features of this invention are —1. The application of a hinged catch to the mortising chisel for the purpose of drawing out the core as the chisel is moved upwards in the act of mortising. 2. A mode of connecting the chisel to the vertical reciprocating spindle. 3. A mode of connecting the spindle or chisel-holder to the lever employed for actuating the same for the purpose of enabling the position of the chisel to be readily reversed; and, 4. A mechanical arrangement for actuating the chisel, and reversing its position, and for securely holding the chisel whilst in the act of mortising.

JONES, JAMES GRAFTON, of Islington, Middlesex, engineer. *Certain improvements in the means of conveying signals or intelligence from one part of a railway train to another.* Patent dated September 24, 1853. (No. 2202.)

The inventor causes to be extended over the tops, or other convenient part of the carriages forming a train, a flexible tube, one end of which terminates close to the engine-driver, the other end being wound round a drum or reel, fixed in some convenient part of the break-van or carriage occupied by the guard.

TUCKER, HIRAM, of Massachusetts, United States. *A new and useful improvement in the art or process of applying colours to a surface by means of a liquid.* Patent dated September 24, 1853. (No. 2203.)

The inventor says, "In my researches I have made the discovery that the gum resin from the 'Dammara Australis,' or 'pinus kauri' (which is known in commerce by the names of kauri or cowdee, dammar or dammarra,) when mixed with a suitable vehicle, such as the essential oil of turpentine, for instance, will combine with a drying oil, and impart to it not only that property so desirable for the marbling process, but it will give to the oil a body and siccative properties of great advantage to oil colours applied by such means."

DALGETY, ALEXANDER, of Florence-road, Deptford, Kent. *Improvements in lathes.* Patent dated September 24, 1853. (No. 2204.)

In this invention the top of the lathe-bed is cast without the usual opening, the saddle and all its upper fittings sliding upon it, so that the leading screw and nut are kept perfectly clean. The two flanges of the bed being raised higher than the centre, allows them to be undercut on their inner edges for bolting down the poppet-head at any required distance.

FARMER, WILLIAM, of Fulham Brewery, High-street, Fulham. *Improvements in apparatus for preserving provisions.* Patent dated September 24, 1853. (No. 2205.)

This invention consists in using two waterproof vessels, one placed within the other, leaving a space of two or three inches between the two for containing water. The provisions are placed in the interior vessel, which is provided with lids on hinges for the purpose of putting in and removing the provisions when required.

AUSTIN, CHARLES EDWARD, of Rook-

woods, Stroud, Gloucester, civil engineer. *An improved reaping, gathering, and binding machine.* Patent dated September 24, 1853. (No. 2206.)

In this machine the scythes or knives which are to cut the corn revolve horizontally in a circle at a suitable distance from the ground, and above them revolve several cradles, which are suspended from upright supports rising from the frame to which the knives are attached. The knives in revolving pass between two plates, which have such a form that every point in their edges comes in contact only with those stalks of corn which a knife is at the same moment severing, the cradles passing above those plates and through openings in an opposite curved guide.

MAITLAND, CHARLES, of Alloa, Clackmannan, North Britain, brewer, and WILLIAM GORRIE, of Rosemains, Cranston, Midlothian, North Britain, factor. *Improvements in apparatus for heating water or other liquids.* Patent dated September 24, 1853. (No. 2207.)

Claims.—1. A mode of heating liquids by steam, wherein the water entering at the top or one end of the apparatus traverses a series of diaphragms arranged one below the other, and presents thin strata of liquid to the action of the steam issuing or bubbling up from beneath through perforations or tubes in the diaphragms. 2. The use, in apparatus for heating water and other liquids by steam, of dripping pipes and cups for the downward conveyance of the water, so as to prevent the interference and confliction with each other of the opposed currents of ascending steam and descending water. 3. A mode of heating liquids by means of minute ascending steam jets passed through thin traversing films, or layers of descending liquid.

SMITH, JAMES, of Law Hill, Perth, Scotland, veterinary surgeon. *Improvements in scythes.* Patent dated September 26, 1853. (No. 2208.)

This invention is intended to furnish the means of more readily adapting the scythe to the work required to be done in such manner that the blade or cutter may be made to operate with more facility. For this purpose the parts of the scythe are so constructed as to admit of different modes of adjustment.

ELLISDON, JOSEPH, of London, designer and cabinet-maker. *Improvements in chairs, whereby they are rendered more portable and can be converted into other useful articles of household furniture.* Patent dated September 26, 1853. (No. 2210.)

This invention consists in an arrangement by which the two cushions and frames forming the back can be folded down on to the seat of the chair and form a raised seat; or by lifting the back frame off the catches upon which it rests when forming a chair, it can be carried backwards, by which operation the front frame of the back to which it is jointed will be drawn down backwards to an horizontal position, and the set of folding legs will fall down towards the ground, and taking a perpendicular position will support the extreme end of the frames, so that the chair is converted into a settee or lounge.

WINTER, HENRY, of Castle-street, Holborn, London. *An improvement in trousers to supersede the use of braces, which improvement is applicable to other articles of apparel.* Patent dated September 26, 1853. (No. 2211.)

This invention consists in attaching a spring to articles of apparel. The spring, which is generally of a V shape, is made of that kind of brass wire of which the springs for ladies' French clogs are ordinarily constructed. Rows of this wire are attached to a piece of cloth, leather, or other fabric, by stitching or sewing, and the whole is covered with the same material, or with any coloured fabric to suit the taste.

CLOSSMAN, FRANCIS FREDERICK, of Park-lane, Hyde-park, Middlesex, gentleman. *The production and application of certain materials to be employed in the manufacture of textile fabrics, and for other purposes.* Patent dated September 26, 1853. (No. 2213.)

This invention consists in the application to the manufacture of textile fabrics, paper, and other materials, "of the fibres of all the species of Malvaceous plants, and especially those under the name of 'Althæa officinalis.' The fibres may be obtained by steeping the plant in water, subjecting it to the action of steam, or by any other suitable means"

SHARP, WILLIAM PRIOR, of Manchester, engineer, JOHN HILL, the younger, of the same place, manager, and WILLIAM MARTIN, of the same place, manager. *Improvements in machinery for spinning and doubling cotton and other fibrous substances.* Patent dated September 27, 1853. (No. 2216.)

Claims.—1. The application to self-acting mules and other similar machines of a conical cam, and certain parts in combination therewith as substitutes for the ordinary copping motions. 2. The application of a friction-break to check the over-running of the going-in scroll, and to regulate the tension of the scroll-band, thereby dispensing with the counter scroll-band, and other parts connected with it. 3. The application of a moveable curved inclined piece and plate to the ordinary copping motion of self-acting mules. 4. An improved combination of parts for driving

the drawing-rollers during the running in of the carriage.

BURY, ISAAC, of Lower Moseley-street, Manchester, Lancaster, embosser and finisher, and WILLIAM GREEN, of Islington, Middlesex, engineer. *Improvements in treating, stretching, or finishing textile fabrics, and in machinery or apparatus for effecting the same.* Patent dated September 27, 1583. (No. 2217.)

This invention consists—1. In communicating tension to textile fabrics when out of the loom in the direction of the warp and of the weft simultaneously, for the purpose of keeping them to their original size, or nearly so in one, while elongating or distending them in the opposite direction; also in elongating textile materials after they have been partially woven, and preparatory to the final weaving operation. 2. In imparting the "elastic finish" to textile fabrics without the use of pin-points on the sides; also in giving softness to and in elongating textile materials, whether they have been wholly or only partially woven by synchronous operations. 3. In removing from and in imparting certain colours to textile fabrics, whether they are wholly or only partially woven, by forcing currents of hot air or vapours, or gases charged with various chemical agents, upon the same. 4. In the employment of hot air for drying textile fabrics, whether they are woven or only partially woven when subjected to either of the before-mentioned operations. And lastly, in the construction of machinery for performing these processes.

BRISCO, ROBERT, of Low Mill-house, St. Bees, Cumberland, Esq., and PETER SWIRES HORSMAN, of St. John's, Beckermet, same county, gentleman. *Certain improvements in the preparation of flax and other vegetable fibrous substances.* Patent dated September 27, 1853. (No. 2218.)

This invention consists in heating water for steeping or retting flax or other vegetable fibres by means of the flames arising from jets of gas, or from the combustion of oil, grease, tallow, hydro-carbons, or other combustible matters to be burned in lamps, or other analogous apparatus, its essential feature being the facility with which the heat evolved from the flame, and consequently the heat of the water, can be regulated.

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex, Esq. *Improvements in the manufacture of pulp for paper-makers.* (A communication.) Patent dated September 28, 1853. (No. 2219.)

This invention consists in producing paper pulp from the leaves of the dwarf palm, and from straw and other similar substances, as follows. The inventor combs the substances mentioned in order to divide the fibres, cuts them into short lengths, then passes them with water through a metal mill having teeth, which reduce them. The water is afterwards separated from the fibre by a sieve of cloth, placed at an angle below the mill, which sieve is rapidly shaken, to cause the fibre to descend into a receptacle below. The pulp thus prepared is boiled in water containing an alkaline sulphuret, and is afterwards treated with acidulated water, which causes sulphuretted hydrogen to be liberated in the pulp, which is then washed in water and squeezed dry, to remove the acid. The pulp is next placed in a bath containing one of the hypochlorites, which is undergoing decomposition by the action of an oxide of a metal, or by any other substance that in a similar manner liberates oxygen in its allotropic form, by the agency of which the bleaching is effected. When this process is complete, the pulp is ready for the paper-maker.

GIRARD, LOUIS DOMINIQUE, civil engineer, of Paris. *Certain improvements in hydraulic engines.* Patent dated September 28, 1853. (No. 2220.)

This invention consists in obtaining power from a river or running stream, by placing in and across the same a wheel, on the circumference of which are placed inclined or screw blades. The water is prevented from approaching the centre by a suitably-formed screw, and proceeds to the lower part of the circumference of the wheel, and then acts on the blades.

BARSHAM, JOHN, of Kingston-upon-Thames, Surrey. *Improvements in the manufacture of bricks, tiles, and blocks.* Patent dated September 28, 1853. (No. 2221.)

This invention consists in arranging an extensive trough or hollow tray in connection with a series of boards, each of the size of several bricks, tiles, or blocks. The boards are first placed at the bottom of the tray or trough, so as to form a false bottom, and the clay or brick-earth is then filled into the trough or tray, and pressed by rollers or other means, which are either passed over the trough or tray, or they remain stationary whilst the trough or tray passes under them. The mass of clay or brick-earth is then divided by wires or cutters into the sizes of the boards, and again by other wires or cutters to the sizes required, and by the aid of the boards are then conveyed into the drying-room.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

NEAL, STEPHEN, of Manchester, Lancas-

ter, mechanical engineer, and WILLIAM BLANCHARD JERROLD, of the Inner Temple, gentleman, and CONRAD MONTGOMERY, of Cornhill, London, gentleman. *Improvements in machinery for the manufacture of casks and barrels.* (A communication.) Application dated September 20, 1853. (No. 2183.)

This invention consists in constructing machinery for chiming, creusing, and jointing staves, the blanks being held during these operations by pressing blocks, and acted upon by suitable cutters. The invention also comprises machinery for effecting the preparatory sawing of stave-blanks, for cutting the heads after they have been jointed and put together, and for giving the requisite bevel to iron hoops used for hooping casks and barrels.

SMEDLEY, THOMAS, of Holywell, Flint, gentleman. *An improved railway-train signal, communicating between the guard and engine driver.* Application dated September 20, 1853. (No. 2189.)

This invention consists of a peculiar arrangement of sliding-rods or shafts, which being placed below the flooring of railway carriages, have the property of elongating when struck at one end, and of contracting by the action of the motion of the carriage or train, so that by them the guard can strike any suitable alarm fixed near the engine driver.

WHITE, GEORGE, of Laurence Pountney-lane, London, agent. *An improvement in paddle-wheels.* Application dated September 22, 1853. (No. 2195.)

The nature of this invention consists in having each paddle of a paddle-wheel moveable on a horizontal axis which turns at its extremities in suitable collars or holes formed in the spokes of the wheel, thereby permitting the paddles to assume suitable angular positions varying at different points of the revolution of the wheel.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, Holborn, City, London. *The application of the extract of the pine and other trees of the fir tribe to dyeing and colouring purposes.* (A communication.) Application dated September 23, 1853. (No. 2199.)

"The astringent properties and the great analogy," says the inventor, "which the tannin extract of pine presents with catechu in many cases allow of employing the former as a colouring matter in the art of dyeing, of printing upon tissues, and also as a precipitating body in the manufacture of beer."

DANTEC, WILLIAM, of New Quay, Liverpool. *Improvements in purifying water.* Application dated September 23, 1853. (No. 2201.)

This invention consists in the employment of hydrate of barytes (caustic barytes), which is to be mixed with water that is contaminated with sulphates, or carbonates of lime, or magnesia, or other impurities, in order to decompose and separate them from the water, which may be afterwards filtered; or the impurities may be allowed to subside in it before it is used.

BIDDELL, WILLIAM ADOLPHUS, of Great Sutton-street, Middlesex, brass-founder. *Improvements in alarums and signals to be used in or on railways, ships, houses, buildings, plantations, or other places, for the purpose of giving audible or visible signals in cases of danger or alarm.* Application dated September 26, 1853. (No. 2212.)

This invention consists in placing a detonating or explosive compound in a cylinder or case, in which is placed a moveable piston or block, so arranged that it may be drawn forward, and made to compress the detonating ball or balls, placed in the cylinder or case, and thereby explode them.

POPPLE, ROBERT, of Beverley, York, colour manufacturer. *Improvements in machinery for slubbing, roving, and spinning cotton, and other fibrous substances.* Application dated September 27, 1853. (No. 2214.)

The peculiarity of this invention is the application of a second set of rollers to machines for roving, slubbing, and spinning cotton, or other fibrous substances, in such manner that the slubbing and roving processes are effected by one machine.

HICKSON, WILLIAM, of Carlisle, Cumberland, gentleman. *Improvements in machinery for the manufacture and packing of bread or biscuits.* Application dated September 28, 1853. (No. 2223.)

In carrying out this invention, the ingredients are amalgamated in a semi-cylindrical trough provided with a double case, so as to leave a space between the inner and outer parts of it, through which space hot water is caused to circulate in order to keep up a given temperature.

PROVISIONAL PROTECTIONS.

Dated February 23, 1854.

436. Charles Walker, of Bury, Lancaster, engineer. Improvements in purifying water for steam boilers.

Dated February 28, 1854.

478. Theobald Denny, of Strasbourg, France, engraver. Improvements in engraving.

Dated March 8, 1854.

553. William Isaac Cookson, of Newcastle-on-Tyne, gentleman. An improvement in the reduction of lead ores.

Dated March 20, 1854.

651. Edouard de Mars, of Paris, France, gentleman. Certain improvements in windlasses or

capstans. A communication from Ferdinand Femé.

653. John Bird, junior, of Manchester, Lancaster, machinist. Improvements in the manufacture of silk into threads required for woven fabrics, for sewing and for other purposes, and in machinery to be used for these purposes.

659. William Locock Webb, of New Broad-street, London, civil engineer. Improvements in pulverizing, washing, and amalgamating quartz, and matters containing gold and other metals.

661. Joseph Perkins, of Kennington, Surrey, architectural modeller. Improvements in metallurgy, especially applicable to the production of type and ornamental forms.

663. James Young, of East Smithfield, Middlesex, gentleman. Improvements in brewing.

Dated March 21, 1854.

665. William Stevens, of Birmingham, Warwick, manufacturer, and William Stevens, junior, of Birmingham aforesaid, manufacturer. New or improved machinery for grinding and polishing lenses.

667. James Hansor, of the Wandsworth-road, Surrey, practical chemist. Improvements in the manufacture of illuminating gas.

Dated March 22, 1854.

669. Richard Roberts, of Heaton Norris, Lancaster, machine-maker, and George Coppock, of the same place, manager. Certain improvements in looms for weaving.

671. Edward Keirby, manufacturer, Radcliffe-close, Manchester, Lancashire. An improved reed for looms.

673. William Fast, of Goswell-road, London. An improved ventilator.

675. Henry Maderson, of Clapham, and George William Warren, of Lambeth, both in the county of Surrey, engineers. An improved safety-guard for gun-locks.

677. John Healey, engineer, and John Foster and John Lowe, spindle-makers, all of Bolton-le-Moors, Lancaster. Improvements in certain parts of machines used for preparing, slubbing, and roving cotton and other fibrous materials.

679. William Dinsley Skelton, of Leeds, York. An improvement in preparing flax for spinning.

Dated March 23, 1854.

681. Bright England, of Leigh, Lancaster, manufacturer. Improvements in the manufacture of woven fabrics, and the machinery or apparatus employed therein.

682. Emmanuel Désiré Coëz, manufacturer, St. Denis, France. Improvements in the preparation of certain substances for the purpose of printing and dyeing fibrous materials and fabrics.

683. William Vitruvius Greenwood and John Saxby, both of Brighton, Sussex, engineers. Improvements in railway signal-lamps.

684. Frederick Seiler, of Interlaken, Switzerland. Improvements in the manufacture and construction of solid and veneered tesselated, and other shaped woodwork, suitable for floorings, buildings, works of art, and other purposes.

685. Laurence Whitaker, of Haslingden, Lancaster, cotton-spinner, and Doctor Ashworth, of the same place, loom tackler. Certain improvements in power-looms for weaving.

687. Alfred Lister, of Birmingham, Warwick, manufacturer. Certain improvements in the manufacture of metallic castings.

688. James Newman, of Birmingham, Warwick, manufacturer. Improvements in the manufacture of metallic tubes.

689. Stephen Holman, of Colney Hatch, Middlesex, engineer. Improvements in machinery for raising and forcing fluids, part of which improvements is also applicable to the guiding of piston-rods generally, and other rods.

Dated March 24, 1854.

690. Richard Montgomery, of the city, county, and State of New York, United States, gentleman. A new and useful improvement in corrugated metals, and in machinery for producing the same.

691. Herbert Room, of Birmingham, Warwick, and William Morton, of Birmingham aforesaid, manufacturers and copartners. A new or improved method of ornamenting metallic bedsteads, and such other articles of furniture as are or may be made of metal.

692. Richard Doidge, of Birmingham, Warwick, manufacturer, and John Cloves, of Birmingham aforesaid, machinist. An improvement or improvements in the manufacture of rolls to be used in shaping and impressing sweetmeats and plastic materials generally.

693. Benjamin Fothergill, engineer and machinist, and William Weild, engineer, both of Manchester, Lancaster. Improvements in obtaining and preparing the fibres of plantain, penguin, and other vegetable substances for manufacturing purposes.

694. Samuel Humphreys, of Green-street, Leicester-square, Middlesex, military ornament manufacturer. Improved apparatus for the heating or distilling of fatty, oily, and resinous matters. A communication.

Dated March 25, 1854.

696. William Wood, of Monkhill House, near Pontefract, York. Improvements in machinery or apparatus for the manufacture of carpets and other fabrics.

697. Edward Bagot, of Llanelly, Carmarthenshire, South Wales, civil engineer and mineral surveyor. Improvements in the manufacture of rails for railways.

698. James Lochhead, of Kennington, Surrey, gentleman, and Robert Passenger, of Union-street, Southwark, Surrey, gentleman. Improvements in the manufacture of glass or other vitrified substances.

699. James Robertson, of Glasgow, Lanark, North Britain, engineer. Improvements in lifting or transporting heavy bodies.

700. Walter Neilson, of Glasgow, Lanark, North Britain, engineer. Improvements in marine steam machinery.

701. Thomas Gibson, manager, and William Knighton, foreman moulder, both of Staveley Works, Chesterfield, Derby. Improvements in moulding and casting metals.

702. Thomas John Smith and Joseph Smith, both of Queen-street, Cheapside, London, pocket-book makers. Improvements in the manufacture or construction of pocket-books, portfolios, and similar articles.

703. William Adolphus Biddell, of Great Sutton-street, Middlesex, brass-founder. Improvements in alarums and signals to be used in or on railways, ships, houses, buildings, plantations, or other places, for the purpose of giving audible or visible signals in cases of danger or alarm.

704. George Beaumont, of Halifax, York, gentleman. Improvements in machinery or apparatus for the manufacture of solid, hollow, and ornamental bricks.

Dated March 27, 1854.

706. Henri Adolphe Archereau, of Paris, France. Certain improvements in treating powders of charcoal, coke, coal, peat, and generally all matters obtained by the carbonization of mineral, vegetable, and animal substances, and in applying the said powders to useful purposes.

708. Frederick Phillips, of the Hall Farm, Downham, near Brandon, Suffolk, land-agent. Improvements in machinery or apparatus for cutting, grating, or preparing vegetable substances.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," April 7th, 1854.)

2572. John Hyde. Improvements in furniture castors.

(From the "London Gazette," April 11th, 1854.)

2598. Jerome André Drieu. Improvements in machinery for cutting velveteens and certain other fabrics to produce a piled surface.
2610. Edmund Gregson Banner. Improvements in saddlery and harness.
2657. John Ferguson. Improvements in furnaces and fire-places, and in the prevention of smoke.
2704. Augustus Radcliffe. An improved construction of glazier's diamond.
2728. William Beckett Johnson. Improvements in steam engines.
2732. David Chalmers. Improvements in railway breaks and signals.
2787. Richard Balderstone. Improvements applicable to spinning-machines known as mules, and to machines of similar character, for clearing or cleaning certain parts of such machines.
2796. Joseph Dilworth. Improvements in escape-valves and safety-valves.
2798. John Henry Johnson. Improvements in the treatment or manufacture of caoutchouc. A communication from Charles Eugene François Guibal and Louis Philippe Bernard Edouard Cumenge, of Paris, France, manufacturers.
2832. George Ross and James Inglis. Improvements in looms.
14. John Collins. Improvements in the manufacture of vinegar.
39. Anthony Bernhard, Baron Von Rathen. Improvements in chimnies and flues of houses, and in stoves to be employed therewith, whereby better draught will be obtained, consumption of fuel will be diminished, smoke, fog, and night damp will be prevented from entering apartments, more warmth will be thrown out, and whereby fire in the chimney can be readily extinguished.
60. Adolphe Drevelle. A new combing-machine, suitable for any textile or fibrous matter. A communication from Augustin Morel, of Roubaix, France.
79. John William Partridge. Certain improvements in the manufacture of soap.
284. Dominiques Deyres. Certain improvements in drilling or boring.
290. Andrew Duncan. Improvements in bleaching.
294. James Murdoch. An improved process for manufacturing paper. A communication.
310. John Dalton. Improvements in the construction of bowls or cylinders employed in printing and other processes, and which improvements may also be adapted to other mechanical appliances.
410. Henry King. An improved mode of signalizing between the guard and driver of a railway train.
411. John Gedge. Improvements in the construction or adaptation of certain fittings for gas. A communication.
442. William Ryder and James Ryder. An improved composition applicable to coating metals.
511. Andrew Barclay. Improvements in arranging and working mining engines and machinery.
574. Simeon Mosely. Improvements in the manufacture of artificial palates for the adaptation of artificial teeth.
626. George Pead and Cornelius Wyatt. An instrument for readily ascertaining the wear of the bearings of railway carriages.
627. Miles Binns and John Pollard. Improvements in apparatus for combing wool, cotton, silk, flax, or other fibrous substances.
630. Donald Bethune. Improvements in the construction of vessels propelled by steam.
632. James Cavanah. Improvements in sails for navigable vessels, and in the apparatus for working them.
667. James Hansor. Improvements in the manufacture of illuminating gas.
670. Alfred Vincent Newton. Improvements in japanning leather and other fabrics. A communication.
676. Thomas Simons Watson. An improved railway traverser.
689. Stephen Holman. Improvements in machinery for raising and forcing fluids, part of which improvements is also applicable to the guiding of piston-rods generally, and other rods.
690. Richard Montgomery. A new and useful improvement in corrugated metals, and in machinery for producing the same.
696. William Wood. Improvements in machinery or apparatus for the manufacture of carpets and other fabrics.
698. James Lochhead and Robert Passenger. Improvements in the manufacture of glass or other vitrified substances.
700. Walter Neilson. Improvements in marine steam machinery.
702. Thomas John Smith and Joseph Smith. Improvements in the manufacture or construction of pocket-books, portfolios, and similar articles.
704. George Beaumont. Improvements in machinery or apparatus for the manufacture of solid, hollow, and ornamental bricks.
708. Frederick Phillips. Improvements in machinery or apparatus for cutting, grating, or preparing vegetable substances.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed April 7, 1854.

2296. Joseph Porter.
2299. Joseph Lambert.
2347. James Higgins and Thomas Whitworth.
2372. The Hon. Frederick William Cadogan.
2373. Auguste Edouard Loradoux Bellford.
2376. Frederick Samson Thomas.
2409. John Norton.
2415. James Barton.
2427. William Melville.
2449. Thomas Stainton.
2578. Edwin Kesterton.
2592. George Frederick Parratt.
2761. Auguste Edouard Loradoux Bellford.
2834. William Edward Gaine.
2956. Josiah Latimer Clark.

1854.
40. Jesse Ross.
88. Arthur Parsey.
158. William Darling.
198. Samuel Slack Stallard.
212. Josiah Latimer Clark.
226. Richard Garrett.
252. Francis Herbert Wenham.
269. Charles Hastings Collette.
278. Alfred Vincent Newton.
291. Walter Neilson.
304. Alfred Vincent Newton.
339. John Rogers.

Sealed April 11, 1854.

2329. James Worrall, junior.
2330. Charles Rowley.
2336. John Francis Porter.
2338. George Frederic Goble.
2339. John Morison and Daniel Hurn.
2343. Edme Jules Maumené.
2344. Robert William Waithman.
2346. George Bradley.
2395. John Palmer de la Fons.
2461. Joseph Beasley, junior.
2608. Salomon Sturm.

1854.
208. Joseph Atkinson.
231. Arnold Morel Fatio and François Verdeil.
295. John Eloe.
332. William Whiteley.
393. Edward Loysel.
460. Frederick William Alexander de Fabeck.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

Homogeneous.—Your letter came too late for insertion in this Number, and you will see that Mr. Baddeley's second reply to *Homo* renders its publication unnecessary.

W. Gosling.—We are not aware of any patent having been obtained for a method of communicating between the guard and driver on railway trains specially adapted to trains descending inclines. Several contrivances have, however, been invented for that purpose, and many of the patented systems of communication would answer as well under those mentioned as under any other circumstances.

P. Hillon.—Yours will probably be inserted in our next Number.

J. Hope.—Yours is received with thanks.

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GRIST'S PATENT STAVE-JOINTING MACHINERY.

Fig. 3.

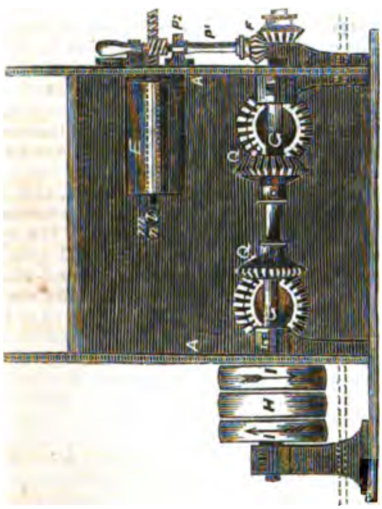


Fig. 2.

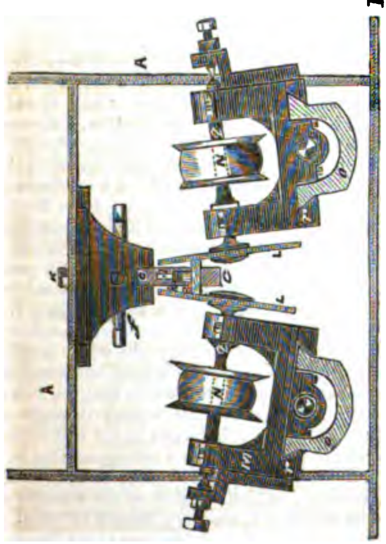
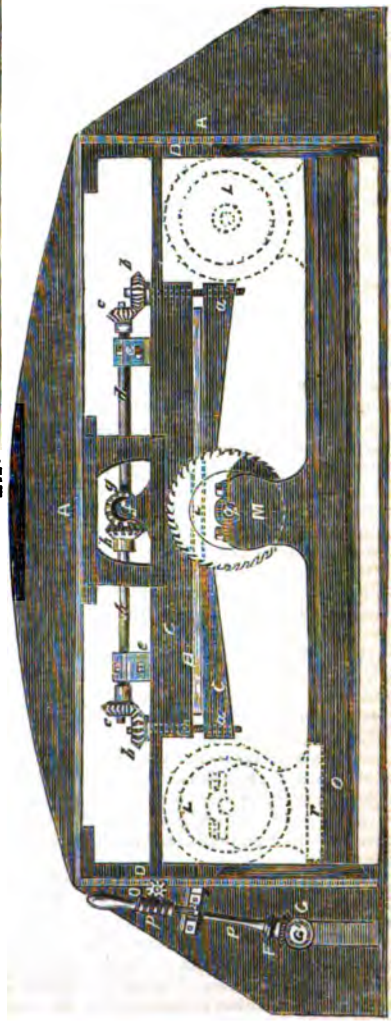


Fig. 1



GRIST'S PATENT STAVE-JOINTING MACHINERY.

(Patent dated September 10, 1853.)

Mr. Grist, of Islington, whose improvements in cask-making were described in Nos. 1575 and 1580, has since obtained letters patent for an excellent machine for jointing staves, with which any required bevel, quarter, or bilge may be obtained by means of either saws or cutters, the stave being held flat in a vibrating bed or clamp during the operation.

The blank to be formed into a stave is fixed firmly on the bed by means of pressure, in order to prevent the wood from swerving or "buckling," and a slight motion round its centre is imparted to the wood by means of screw or other suitable gearing. On one side of the blank, at one end, and on the opposite side at the other end, the inventor mounts a cutter or saw, and both of these are caused to travel in a straight line the whole length of the intended stave, the motion of the wood on its centre presenting its edges to be shaped by them as they advance. The engravings on the preceding page represent one method of carrying the invention into operation. Fig. 1 is a side elevation, fig. 2 a section, and fig. 3 an end view of a machine, in which saws are used for cutting or jointing the stave, in which the blank is made to oscillate upon its centre horizontally. A A is the general framework of the machine; B is the blank, which is held between the clamps, C C¹. The lower clamp, C¹, is caused to recede or open from the upper clamp, to admit of the insertion of the blank between them by means of the screws, *a a*, which are tapped one into each end, and have keyed upon their upper ends small bevel-wheels, *b b*, into which gear similar bevel-wheels, *c c*, keyed upon the shaft, *d*, mounted in bearings, *e e*, upon the top surface of the upper clamp, C. The shaft, *d*, is caused to revolve by means of a winch-handle fitted upon the square ends of the spindles, *f f*, which have mounted upon their opposite ends bevel-wheels, *g*, which gear into the bevel-wheel, *h*, on the shaft, *d*. By this means the screws, *a a*, are both caused to turn simultaneously, so as to bring the clamps towards each other, or to open them according to the direction in which the spindles, *f f*, are turned for the insertion of the blank or withdrawal of the cut or jointed stave. In order to hold the blank more firmly between the clamp, and to meet any unevenness there may be in the wood, the inventor makes use of a series of plugs inserted into recesses, *i*, formed in the under side of the clamp, C, and fitted with helical springs which abut against a shoulder upon the plug, and also against a shoulder in the recess, whereby the plugs are forced down upon the wood, and, combined with the screws, *a a*, serve to hold the blank firm, and prevent it from swerving during the operation of cutting. The plugs are prevented from falling out when the clamp, C¹, is lowered, by means of pins or screws, *k*, passed through the upper clamp, and through slots in the spindles of the plugs. D D are pieces of metal bolted firmly to the framework, and between the planed edges of which the ends of the top clamp, C, are supported, but left free to slide or oscillate between them when acted upon in the following manner:—*l* is a pin, which is firmly fixed in one end of the upper clamp, C, and passed through a slot, *m*, in the end framing. *n* is a rod, one end of which is passed over the end of the pin, *l*. This rod is supported by and free to slide in the bracket, E, and has cut upon its opposite end the thread of a screw, which is tapped through the centre or boss of a small worm-wheel, *o*, into the teeth of which the thread of the endless screw, *p*, takes. The spindle, *p*¹, of the endless screw is passed through and supported in the bracket, *p*², and has keyed upon it the bevel-wheel, F, geared into by the bevel-wheel, G, upon the main shaft, G¹, set in motion by the driving-pulley, H, which is fast upon the shaft. I I are loose pullies, which are caused to revolve in opposite directions by suitable driving-belts from the steam engine or other prime mover. By this arrangement of gearing, when the machine is set in motion the clamps holding the rough blank, and necessarily the blank itself, are caused to rock partially upon the centre pin, K, which is passed through the upper portion of the framework, and centred in the upper clamp, C. L L are two circular saws mounted upon the spindles, *q q*, turning in the frames, M M, and driven by the strap-pullies, N N; *r r* are V-pieces, which are bolted to the under side of the frames, M, and correspond to the bevelled edges of the hollow segmental plates or beds, O O, which run the whole length of the machine, and are supported in circular discs formed with bevel edges, and capable of being turned so as to set the saws to any required angle, in which position they are retained by screws or other suitable means. P P are two screws which are tapped through nuts bolted to the under side of the frames, M. These screws turn in bosses in the end framing, and have keyed upon one end of each a bevel-wheel, geared into by a corresponding bevel-wheel, Q Q, keyed upon the main shaft, G¹, and in such a position that, when in motion, they cause the screws to turn in opposite directions; so that, supposing the circular saws to be in the position represented in the dotted lines in fig. 1, they are caused to travel in a straight line from end to end of the machine, and to press one another at or about the centre. When they reach the end of the machine opposite to that from which they started, the blank

will have been jointed or shaped into a stave having the requisite bulge and bevel. The saws having thus arrived at the opposite ends of the machine, the strap is thrown from off the fast pulley, and the machine thereby stopped; the finished stave is withdrawn from the clamps, and a fresh blank inserted. The reversing strap is then thrown upon the fast pulley, and the machine is again set in action, and the saws are caused to traverse the length of the machine to their former positions, and at the same time, and by the same reversing action, the clamp is caused to rock or turn partially in the opposite direction, and the second blank will thus be formed into a stave.

A NEW SYSTEM OF SEA-COAST AND OTHER LIGHTS.

(*Concluded from page* 318).

In our former paper on this subject, it is stated that, in order to apply Mr. Babbage's occulting system, all revolving lights must become fixed. In the year 1851, in which the system was published, there were about 1750 lights distributed over the world, of which not above 270 revolved, and the revolving lights were already more easily distinguished from their various durations of darkness. The chief object, however, of a revolving light is to render it visible at a greater distance. This is accomplished by optical means in concentrating the light spread over a large portion of the horizon into a smaller space. Since the Exposition of 1851, Mr. Babbage has therefore applied his occulting principle to revolving lights.

TELEGRAPHIC SIGNALS BETWEEN SHIPS AT NIGHT.

The application of the system of occultations to ships at sea, may not, perhaps, be quite so easy as that which is proposed for lighthouses, but no objections have yet occurred which appear at all insurmountable.

Specific lights have already been employed to distinguish sailing-vessels from steamers, in order to prevent collision. By adapting the system of occultations to one or more of the lights of steamers, their character would appear more distinctly, and at greater distances. Perhaps, indeed, it would be better to have the distinctive character of a steam-vessel indicated by a continual enlargement and diminution of its light, rather than by an occultation. Two steamers also would have much less reason for approaching each other, because they could hold any correspondence by signals. They might also by the same means convey to each other their intended course long before they approach each other.

OF A UNIVERSAL DICTIONARY OF SIGNALS.

Whether the system of occultations be generally adopted or not, numerical dictionaries of signals have been found absolutely necessary, and have long been in use. The rapid increase, both of ships and of steamers, renders some common language for all nations almost a matter of necessity.

The concurrence between adjacent nations in numbering their respective lighthouses, would be essential if any *numerical system* is adopted for distinguishing them. Such an opportunity ought not to be lost of rendering those discussions still more useful by attempting to organize a plan for a universal system of numerical signals. The first step might, perhaps, be that each nation should supply all questions and answers that ships could ever require for their safety or convenience. Out of these the duplicates being omitted, the first draught of the naval part of the dictionary might be formed. This being submitted to criticism, would probably itself suggest many additions.

The questions should be very carefully translated into the languages of all maritime nations, and should be printed in columns for each language.

A dictionary of this kind, containing about five thousand terms in ten European languages, was published in 1849, by M. K. P. Ter Reehorst. The words are contained on about two hundred double pages; and since each word, of which there are usually about twenty-five in a page, is numbered, this work might be used as a numerical telegraphic dictionary.

If a more general dictionary were undertaken, other considerations arise, and the great questions relating to the philosophy of language must be examined with reference to such a work. It will, however, be sufficiently early to enter on that subject when any steps are seriously taken to accomplish so desirable an object.

The continually increasing use of the electric telegraph renders a universal language still more desirable.

ON THE IDENTIFICATION OF A LIGHT-HOUSE.

A case has been more than once suggested to the author, to which it may be desirable to advert, in order to point out the course of experiment which may lead to its removal.

At certain periods of the year, and on certain coasts, there occur dense fogs. Under these circumstances, it has happened that a vessel has, on a partial and mo-

mentary opening in the fog, insufficient to show more than a single occultation, found herself almost close upon a lighthouse. In such a case, there is neither time nor opportunity to ascertain its number.

It may here be remarked, that the assumed danger of going ashore is so imminent, that it is not *necessary* to know the number. It is sufficient for the moment to know that there is a lighthouse in a certain direction, which is close at hand.

It must, however, be admitted, that in common with all received systems of lights, the method of occultations will not furnish a remedy. If a coloured light is already employed in particular localities, to meet such a case, it will still accomplish the purpose when occultations are applied to it.

The danger, although rare, ought, however, to be provided against. The following remarks are suggested to assist in attaining that object:

The time between two occultations (usually one second) might be doubled in special cases. A little experience would enable most men to recognise the fact after two occultations. If such lighthouses were placed alternately with others, no lighthouse would be mistaken for either of its adjacent neighbours. This plan might be partially extended, but it is liable to objections.

Another view may be taken. Is it possible to give a specific character to the occultation itself? It has been found, that if the occulting cylinder descend rather slowly over the lamp, and then, after a *very short* pause, rise suddenly, the effect is best. It has also been observed, when an accidental defect in the apparatus caused the cylinder, after suddenly rising up, to rebound, and again to obscure partially the lamp, that the nature of the occultation was peculiarly characteristic. This peculiarity was very remarkable up to a certain distance, after which it became lost. Almost any form of peculiarity can be given to the occultations by giving proper forms to the cams which govern them. The fact that such peculiarities are not seen until the ship has approached within certain distances, does not appear to present a material difficulty, and may even prove an advantage.

It would seem, then, to be desirable to institute a series of experiments to determine the following questions:—Can the occultations of a lamp, in which the rapid re-appearance of the light occurs from the falling *down* of the shade, be distinguished from those in which it occurs in consequence of the rapid *rising up* of the shade; and if so, at what distance? In some cases, the shades might move from right to left, and in the reverse direction. What peculiarities in occultations can be seen at the greatest distances?

Amongst the experiments still required may be mentioned the loss of light resulting from the interposition of coloured glasses, and also the proportion of light lost by sacrificing *given* portions of various parts of the optical apparatus used for concentrating it. This is necessary, in order to enable us to judge what portion may be most economically sacrificed, in case the space might be required for other purposes.

The dangers arising from fogs are of such an extent that all the resources of science ought to be called in to remove them.

Voltaic light can scarcely be depended upon, except under continual superintendence; it would, therefore, be expensive. If, however, any intense light can be found capable of penetrating dense fogs, it might, during their continuance, be good economy to employ it even at considerable expense.

Perhaps the ordinary lighthouse lamps might be supplied with *oxygen* during fogs; its expenditure being regulated by the obscurity to be penetrated.

Possibly portions of phosphorus might be burnt in oxygen, and the lighthouse would then express its number by a series of *flashes*, and of *pauses* between them. The new form which that body is now known to assume might render its application to this purpose free from danger.

ON SOUNDS USED FOR SIGNALS.

Both gongs and bells are employed as substitutes for lights during fogs. I am not aware of any series of experiments on the distances at which sounds of various kinds can be heard. In a question on which so much property and so many lives depend, it is surely important to be well informed. The only resource is experiment. It may be remarked that the low notes of the gong might be confounded with those of the roll of waves breaking on the shore, whilst the shrill whistle of the steam engine will find a rival in the wind whistling through the rigging. The trumpet and the new and still more powerful instrument at the recent exposition ought also to be compared.

Again, although some of these may be heard at greater distances in the open air, some may be more easily adapted to have their sound concentrated and directed, when placed in the focus of a parabolic mirror, or, perhaps at the end of a long tube.

Sound is transmitted to considerable distances through water, and it has been suggested that this might be used in case of fogs. But it seems probable that sound would be much interrupted in its progress, from the constant motion of the waves;

and if it were transmitted at a considerable depth, it might be difficult for a vessel to send down an apparatus to render it sensible.

Experiments should be made on the distance at which sounds can be heard under water in various circumstances of its motion.

If, during storms, the surface only is agitated, it might be possible to transmit sounds in the still water near the bottom to considerable distances. Thus channels might be traversed by telegraphic communications with a less costly apparatus than that of the electric wire. It ought also to be ascertained whether the forms of the instruments struck would enable them to project their sounds in particular directions. Gongs, bells, and the firing of cannon, under water, are among the sounds to be tried.

Whatever may be the sound audible at the greatest distance, it will be necessary to ascertain what are the best means of producing it in greatest intensity—whether by one large instrument, or by many small ones. It seems probable that some combination of discordant sounds may be most effective, because it seems to be a law of our nature that contrasts produce stronger impressions than uniformity. There is one form of sound the most disagreeable with which we are acquainted; it is said "to set the teeth on edge." What is the cause of this, and does that highly obnoxious sound penetrate farther than others? If it penetrate as far as others, it will certainly be the earliest to be noticed.

LIGHTS ON BUOYS.

The time is probably not remote when lights will be placed on floating buoys, for the purpose of pointing out isolated dangers —as sunken rocks, shoals, &c., on which lighthouses cannot be placed, or where the great expense may prevent them from being built. They may also be useful to indicate the channels leading to some few ports of very great resort, in order to render the approach of vessels possible during the night.

The first difficulty in placing lights on buoys arises from the necessity of trimming the lamps, and of supplying them with fresh oil. Galvanic processes seem to present a similar difficulty. The chemical discoveries of recent times, however, offer some hope of removing it. By the destructive distillation of peat, of coal, and of shale, as well as by other methods, a variety of combinations of hydrogen and carbon have been obtained. Some of these only remain liquid under a pressure of two or three atmospheres. They possess considerable illuminating power; and by confining them in a close vessel, and allowing a very small aperture for their escape in the state of gas, a jet of flame may be produced, of uniform magnitude, and without the use of a wick, until the last drop of fluid has evaporated. If such a fluid could be produced at a moderate price, a quantity might be enclosed within the buoy, sufficient to last several weeks, if not months.

Such a light would burn without the necessity of trimming, but it would require mechanism to light it each evening, and to put it out each morning.

Such mechanism already exists in many of our public clocks. If it is thought desirable, too, that it should occult, so as to indicate its number, the plan already described might be applied. Thus the buoy would contain two pieces of mechanism. The only remaining difficulty would be the necessity of visiting the light frequently in order to wind up the two instruments. This might probably be removed by having within the buoy a heavy pendulum, or perhaps two such, swinging at right angles to each other. If the *perpendicular* motion of the buoy could be secured, then the winding up pendulums must be maintained horizontally by means of a powerful spring. These, by the action of the waves, would be continually winding up the springs which drive the mechanisms. This might be so arranged that it would never overwind them.

Spirits of turpentine, benzole, and several other compounds, assume a gaseous state at very low temperatures. If the end of a tolerably thick rod of metal is heated by the flame of the lamp, and the other end conducts the heat to the bottom of the fluid, it is sufficient to produce a continuous stream of gas to supply the burner until the last drop of the fluid is exhausted. Lamps constructed on this principle have, under various names, been in use for several years. If the fluid were sufficiently cheap, one of these movements might be dispensed with, by allowing the light to burn constantly during the day as well as the night.

New forms would be required for such buoys. Probably a columnar form, weighted at the bottom, might give a steadier light amid the fluctuations caused by the waves. These buoys should be attached to their moorings by rings fixed at the centre of resistance.

OF THE MECHANISM NECESSARY FOR OCCULTING LIGHTS.

The period of time occupied by any occulting light in making a signal is so short, that great accuracy in the wheel work is not necessary. In lighthouses the moving power may be a heavy weight driving a train of wheels. This must terminate in a

governor, which presses by springs against the inner side of a hollow cylinder.

When the length of the time necessary to indicate the number of the lighthouse is known, the governor must be so adjusted, that some one axis shall revolve in the given time. A cam wheel must be fixed on this axis, having its cams and blank spaces so arranged as to lift up the tail of a lever carrying the occulting cylinder, at the proper intervals of time. Each tooth of the cam wheel will cause an occultation of the lamp by the cylinder, which is instantly drawn back by a spring.

It is obvious that an axis might be used which moves round in the course of two, three, or more cycles. In this case, the same system of cams would be repeated an equal number of times in the circumference of the cam wheel. This plan is sufficient for lighthouses which are not intended for signal stations also.

When signals are to be used, it is better to have a single cam on an axis which revolves once in the time which elapses from the end of one occultation to the end of the next. The effect of this cam will be, by acting upon a forked lever, to lift up the occulting cylinder. If nothing retain it in that position, the action of the spring on the lever will cause it to descend, and the cylinder, acted on by gravity, will instantly follow. But if an arm is interposed which retains the cylinder, then the forked lever alone will be pulled back by its spring, and the occulting cylinder will remain suspended until the next turn of the cam-wheel.

The suspending arm which was interposed must itself be governed by a cam-wheel, expressing the number of the lighthouse.

When a signal is to be made, an adjustable cam-wheel is to be set to the proposed signal, and is to be fixed upon the axis carrying the constant number of the lighthouse. When the proper time arrives for making the signal, it is only necessary to shift the axis, so that the adjustable cam-wheel shall be moved into the place occupied by the fixed cam-wheel. The signal will now be made and repeated as often as required, after which the original position of the constant cam-wheel must be restored. It is clear that any number of adjusting cam-wheels might be prepared for signals, and put upon the axis at once, so that a series of different signals might be made in a very short time.

Lights to mark the depth of water must have a heavy float connected with them, which, at every foot of its rise or fall, must alter the number of occultations made by the coloured light. It must, also, at the turn of the tide, change the colour of the light. It is sufficient for the present purpose to observe that the mechanism similar to that by which a clock strikes different hours, might be employed for this purpose.

The well in which the float is placed ought to be open to the tide by several small apertures; this would render the rise or fall of the float more uniform.

Telescopes are used for observing lighthouses. They have a small magnifying power, but a large aperture. It is important that they should be as short as possible, for taking in a given visual angle. Possibly those constructed with a lens of rock-crystal might be employed with advantage; but upon this subject, also, experiment must be made.

CONSUMPTION OF SMOKE.

At the discussion that took place at the Institution of Civil Engineers on the papers of Mr. J. Simpson, jun., and Mr. C. Wye Williams, that were published in our last number, an explanation was given, by means of a diagram, of the several divisions of the process, leading to the combustion of the gas in furnaces. The first division gave the mere relative gross bulk of gas and air required for combustion. In the second the mechanical mixture of the gas and air was described, such mixture or contact of atoms being essential to the subsequent chemical union. The third exhibited the several constituents of gas and air; the former being hydrogen and carbon; the latter, oxygen and nitrogen. The relative volumes of each were given, and it was shown that ten volumes of air were absolutely essential to the combustion of one volume of gas. The fourth division showed the proportions in which those constituents combined. The nature of flame and smoke was examined, showing that the intense heat, caused by the combustion of the hydrogen, was the direct cause by which the temperature of the carbon was raised to that of white heat, which produced the luminosity of flame.

This process was illustrated by reference to the mode of producing the intense heat and luminosity required for the oxy-hydrogen microscope. In the latter, the piece of lime or carbon on which the heat was projected, was instantly raised to the temperature of extreme luminosity, neither the lime or carbon, however, suffering rapid combustion. In the former, the carbon of the gas was raised by the same means (the combustion of the hydrogen,) to the high temperature, but could not suffer combustion until it was brought into contact, in its

turn, with its equivalent of the oxygen of the air.

If, however, that supply of air was not provided before the carbon lost its high temperature, it returned to its previous and natural state of a black substance, and gave the black character to the products, called smoke.

The first important condition was then shown to be the providing the required quantity of air. Reference was then made to the area recommended by some authorities as being sufficient to allow the quantity to enter a furnace. It had been considered that even half a square inch of aperture for each square foot of furnace grate, was sufficient for the combustion of the fuel. This was, however, stated to be insufficient for practical purposes; the proper area for admission being from 3 to 6 square inches for each foot of grate, according to the extent of draught and the nature of the coal.

This serious difference was supposed to have been caused by an erroneous calculation of the rate of the current of air entering. For if half a square inch of area was all that was allowed, the air must have a velocity ten times greater than could be shown to have been ever attained.

Thus, supposing a furnace to be 4 feet by 2 feet 6 inches, equal to 10 square feet of bar surface, this would effect a combustion of 2 cwt. of coal per hour, and require, for the gas alone, a supply of 10,000 cubic feet per hour, or, for 20 cwt. of the coal, 100,000 cubic feet.

The following comparison of velocities of the entering air for the supply of the gas gave some idea of the cause of underrating the required area of admission:

Air aperture per square foot of grate.	Velocity of draught per second.	Quantity of air per hour.	Quantity for each ton of coal.
6 square inches	at 5 feet per second	7,500 cubic feet.	75,000
6 " "	at 10 " "	15,000 " "	150,000

then, if the area were reduced to half a square inch, it would require a velocity of 80 feet per second to provide for the admission, within the given time, of the necessary quantity.

By close observation, by means of an ærometer, the velocity of the entering current was estimated at from 8 to 10 feet per second, if the draught was good; and from 5 to 8 feet, when it was but moderate.

Again, it was observed, that by admitting the air through numerous thin films or divisions, the velocity was necessarily reduced, by mere friction through so many half-inch orifices as were exhibited in the models and drawings on the table.

The mode of admitting the air by numerous small orifices, as practised by Mr. C. Wye Williams, was then considered, and it was shown, that the great object to be effected was the division of the air, on its admission to the furnace, so that no more atoms were brought into contact with the atoms of the gas, at any one moment, than were required for their successive union and combustion. If this were the case, combustion and heat would be generated continuously, as the gas and air came into contact. If, however, the air entered in a body, or even in a film, in larger quantities than could be taken up by the gas, before the temperature was lowered, a refrigeratory effect must be the consequence, smoke would be formed, and fuel would be wasted.

It was asserted, that the phrase "burning smoke," was improper, inasmuch as the smoke did not exist until the gases had left the furnace; this was demonstrated by a diagram, showing that on distilling coal in a close vessel, and forcing in a small quantity of air, a jet of gas issued, which, on ignition at the orifice, was almost colourless, then merged into flame, and ultimately became opaque smoke.

It was stated, as an argument for the necessity for some stringent measure, with respect to the engine furnaces in all large towns, that in the last nine years, between 1845 and 1853, eight hundred and one new chimney shafts had been erected in the metropolis, for manufactories, breweries, etc. Some few of them might have been merely rebuilt, after destruction, but the large majority caused additional impurity in the London atmosphere. From 1845 to 1851 the greatest number built, in one year, was ninety-nine; but in 1852 one hundred and eleven were constructed, and in 1853 the number rose to one hundred and twenty-three.

It was contended, that in dealing with the smoke question, too much stress had been laid on the chemical part of the subject, as also, that the statement of its being " im-

possible to burn smoke" had complicated that which was, in itself, a simple question. All that the public cared about was, that by some simple means the black or brown visible smoke should be prevented from forming, or be consumed, if its formation was incidental to perfect combustion. The air necessary to perform this could be admitted anywhere; either through a split bridge,—by the fire-door,—by an infinite number of holes,—between plates with narrow spaces,—or by others arranged like Venetian blinds. Practically the end could be attained by the mechanical systems of Juckes, Hazeldine, Hall, and others, or by the double furnace boilers of Galloway, Rose, McGavin, and others, or by the systems of Williams, Prideaux, and many others. The objections alleged against all these plans were illustrated, and it was stated, that with ordinary boilers, the admission of air invariably reduced the evaporative power, or caused waste of fuel, unless there was a sharp draught, and spare boiler power; but that when these latter requisites were secured, the air might be admitted in any way practically found most convenient.

The arrangement proposed by Mr. Prideaux was noticed as the most creditable mechanism yet brought forward; but its neatness was its only recommendation, as it could not improve the draught, nor could it aid in "burning smoke" better than would be done by merely leaving the furnace door ajar. The remarkable coincidence between the arrangement of the parallel plates in Prideaux's fire-door and that of Williams's well-known and long-practised system was also noticed; it being stated, as fundamental principles, that in the former system, "the door of the furnace should be double, and the air should pass into the furnace through a series of perforations in the inner plate. By this arrangement three important results are secured.—1. *The heating of the air.*—2. *Its sub-division into minute jets.* (This is the precise principle and operation of Mr. Williams's Argand furnace.)—3. The keeping of the outer surface of the furnace-door comparatively cool, and thereby both economising heat and preventing its radiation outwardly, to the annoyance of the attendants."

Drawings were exhibited of a double flue and double furnace-boiler, whose action was stated to be very satisfactory; the proportion of air space provided, in that case, was one square inch to each square foot of grate area. The admission of too large quantities of cold air immediately behind the bridge had been found prejudicial, and the system of admitting the supply of air, through the perforations in the fire-door, was generally preferred. The system of alternate firing, and of having ample boiler space and a good draught, was insisted upon.

It was stated, on behalf of the mechanical methods of firing, that at Price's candle manufactory, at Vauxhall, three methods, Jucke's, Hazeldine's, and Hall's were employed with success. The general principle of a continuous supply of fuel at the front of the fire, by means of moving bars, carrying the coal forward, was common to all these apparatus. The air was admitted only from below and between the bars which were always covered with fuel. The objections urged against these machines were, the first cost and their liability to derangement. These, however, were now diminished, particularly with those of Juckes and Hazeldine, to which preference was therefore given in the construction of new furnaces. They were found to produce almost perfect combustion, and to make a great saving of fuel, with other practical advantages.

Two cases were mentioned, as illustrative of the necessity of admitting the air above the incandescent fuel—the first was that of the ventilating furnaces in pits, where it was essential to raise, to a certain temperature, the largest amount of air, by passing it through or over the fuel in a furnace, in such a manner as to render the air as light as possible, and not to encumber it with smoke;—the second was that of coke ovens, which were now constructed in pairs, and were worked alternately in such a manner that the early smoke from one oven mingled with the later development of gases from the other oven; by this means the appearance of any opaque smoke was entirely prevented.

In reply to the arguments in the papers, and to some of those used by the speakers it was urged, that even with the best construction of furnaces, skilled firemen must be employed, and that it was desirable the subject should be divested of all complexity, and should be rendered clear to the meanest capacities. Instances were given of the advantageous employment of mechanical methods of stoking, particularly at the brewery of Messrs. Truman, Hanbury, and Co., where sixteen sets of Juckes' apparatus had been used for several years, and had induced a great saving of fuel, as well as insured undeviating regularity of temperature in the furnaces. The self-acting systems practised by Brunton and by Parkes many years since were alluded to, and the reasons for their use being discontinued were given; the alleged defects of the systems were shown not to exist in the apparatus of Juckes, Haseldine, and Hall, but that even

they were up to this time unfit for use in steam vessels, where, it had been imagined, that mechanical means of firing would have been most advantageous, but where, in reality, the heat in the furnaces was so intense as to destroy any machinery attached to the fire-bars.

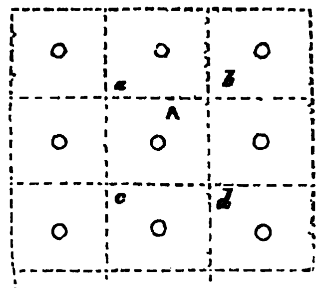
The success attendant on Mr. Houldsworth's system for preventing smoke, and on his invention of the metal rod pyrometer, was described.

The general result of the investigation appeared to be, that, although for certain large establishments, the mechanical methods of firing were successful, it could not be expected they would be adopted for every furnace in the smallest manufactory; therefore, a good system of mingling a due proportion of atmospheric air with the gases evolved during combustion was essential, and the method employed by Williams appeared to fulfil the required conditions.

ON THE STRENGTH OF LOCOMOTIVE BOILERS.

To the Editor of the Mechanics' Magazine.

SIR,—I have just had an opportunity of seeing Fairbairn's interesting paper on "The Strength of Locomotive Boilers, and the causes which lead to their Explosion;" and as the subject is important, and one in which many of your readers are professionally interested, I should be glad if you can devote a short space in you useful Magazine to a few remarks in reference to it. The experiments Mr. Fairbairn has recorded to determine the comparative strength resulting from different dimensions of screwed stay-spaces are very valuable. He has stated, however, in regard to the observed fact of the diaphragm with four stay-spaces sustaining an unexpected amount of pressure before failure, that "the mathematical theory would lead us to expect that the strength of the plates would be inversely as the surfaces between the stays; but a comparison of the results of the experiments shows that the strength decreases in a higher ratio than the increase of space between the stays." Now were the spaces supported by each stay, in the condition merely of *pistons*, maintained in position by the stays as piston-rods, and frictionless at the circumference; as, for instance, were the space *a*, *b*, *c*, *d*, unsupported at the periphery, and sustained merely by A, the stay; we should expect the strength to decrease, as stated above, with the increase of space; that is, to be *inversely as the square of the distance between the stays.* But it seems to me that in calculating the actual strength, the support afforded by the contiguous plates must be considered (each square, *a d*, being viewed *per se*, and the remainder of the plate as firmly supporting it); in fact, that the strength of the square space surrounding each stay must be estimated as a *beam*, and added to the strength it derives from the central stay. I think it may easily be shown that the strength of the square, *a d*, to resist "buckling," or its stiffness under a constant load, which must be esti-



mated when taken in connection with the comparatively unyielding stay, will vary inversely as the distance between the stays. If D and d represent the distances apart at which the stays are inserted in two plates, the strength of each square will be as

$$\frac{1}{D} : \frac{1}{d},$$

supposing the load to be constant, whatever be the size of the square. But as the load increases in the ratio of the space contained between the stays, the comparative strength will, of course, be in that ratio inversely, or as $d^2 : D^2$, or the strength of the plates derived from stiffness and stay-support will be as

$$\frac{d^2}{D} : \frac{D^2}{d} = \frac{d^3}{D^3},$$

or *inversely as the cube of the distance between stays.* This would seem to be the correct law, determining the relations of strength and unsupported space, were the screwed stays simply mathematical lines; but as they occupy a constant space, which therefore bears a different ratio to the varying size of square, the influence of this must be considered if perfect accuracy be required.

Thus, to take the cases cited by Mr. Fairbairn of plates united at 5 ins. and 4 ins. distances by $\frac{13}{16}$ ins. stays. The area of the stay being 0·52 square inch, the ratio of pressure on the two plates,

$$= \frac{(5)^2 - \cdot 52}{(4)^2 - \cdot 52} = \frac{24 \cdot 48}{15 \cdot 48},$$

and the relative *strength* of the two plates will be as

$$\frac{24\cdot48}{15\cdot48} \times \frac{5}{4} = \frac{122\cdot40}{61\cdot92}.$$

The 5 ins. plate failed at a pressure of 815 lbs. per square inch; the ultimate strength of the 4 ins. plate should therefore be represented by

$$815 \times \frac{122\cdot40}{61\cdot92} = 1611 \text{ lbs.}$$

the pressure at which rupture actually occurred being 1,625 lbs.; which slight difference may, I think, be amply accounted for by trifling inequality of riveting, &c., in the two cases. I cannot, therefore, consider the experimental results as anomalous, but, on the contrary, in almost complete accordance with what appears to be the true law regulating the strength of these structures. There appear to be no better data for calculating the strength of plates stayed as above, than those furnished by Mr. Fairbairn in his excellent report, and if 815 lbs. be assumed as the ultimate strength of 5 ins. spaces (keeping in view that the stays are iron screwed into $\frac{1}{2}$ in. copper plate), then the strength for any other distance, *d*, would be

$$815 \times \frac{125}{d^2} = \frac{101875}{d^2} \text{ lbs.}$$

which I believe will be found a sound practical rule for the bursting pressure per square inch. If greater accuracy be required, the diminution of each space by the stay must be allowed for, and the rule then assumes the form,

$$\frac{4075}{d}\left(\frac{25-s^2}{d^2-s^2}\right) \text{lbs.};$$

d being the distance between the stays and *s* their diameter. There seems to be an error of the press in the statement that "riveting the ends of the stay adds to its retaining power an increased strength of nearly 14 per cent. to that which the simple screw affords." From the amounts required in both cases to produce rupture (18,260 lbs. with the screw, and 24,140 lbs. with the screw and rivet), it would appear that the strength of the latter is about 32 per cent. higher than the former, or 24 per cent. on the strength of the screw and rivet combined.

Yours respectfully,

A.

Locomotive Department, Rugby.

ELECTRO-MAGNETISM AS A MOTIVE POWER.

To the Editor of the Mechanics' Magazine.

Sir,—A recent number of your Journal contains a description and engraving of Mr. Allan's "Electro-magnetic motive power engines."

I must express my sincere gratification on reading every notice of a subject which has for many years occupied my attention; whilst, at the same time, I cannot conceal my surprise that the means adopted by Mr. Allan for effecting motion on machinery by the agency of electro-magnetism should receive any commendation on the score of novelty.*

A description of one case of the application of my invention was given in your Journal for June 19, 1852, and contains the following extract:

"It will be seen that moveable armatures thus applied, are capable of producing any length of stroke without any hydraulic apparatus; but this arrangement would not be economical in a *long* stroke, as many of the magnets would thus be idle through a large portion of the stroke, when they could be economically applied by taking advantage of the extreme velocity with which the galvanic action is conveyed and the mode of transference proposed."

For some purposes indeed, though comparatively few in number, I make use of moveable armatures alone; but for the higher purpose contemplated, the application of electro-magnetism to the propulsion of marine land engines, I feel assured that this method cannot be economically applied.

Allow me, for illustration, to take the case of an engine with a stroke of 5 feet, making fifteen revolutions or double strokes per minute. The rod connected with the crank, &c., to give motion to the engine, will pass through a space of 150 feet per minute. Let the distance at which each magnet acts effectively be $\frac{1}{4}$ an inch, our engine will require 240 magnets to produce the number of revolutions supposed, and, as each magnet only acts during the time required for its passage through the space of $\frac{1}{4}$ an inch, it follows that each magnet remains inoperative 239 portions of time out of the 240 employed for the successive action of the whole series.

Let us now avail ourselves of the intervention of a non-elastic fluid, or practically such, as a means of transferring the magnetic power, and see how the matter stands. It has been proved that a powerful electro-magnet is capable of attracting, with its whole force, an armature 300 times per minute; that is to say, that its connection

[* We are greatly surprised to find Dr. Kemp express himself in this manner. Our readers will be able to see for themselves that our commendations of Mr. Allan's engines were perfectly well deserved. Ed. M. M.]

with the galvanic battery can be thus frequently broken and renewed without detracting from its energy. Let now twelve magnets of the same power, and acting at the same distance as in the above hypothesis, be applied in connection with an hydraulic system, so arranged as to transmit the force of the magnets, when in action, to machinery, by means of a rod and crank; and, to take the simplest case, let each magnetic unit of attractive distance (half an inch) represent a smilar unit of motion in the rod; of the twelve magnets, let six be employed for each of the force-pumps of an apparatus similar to that delineated in the *Mech. Mag.*, No. 1506, and each of these sets be submitted to the action of 300 galvanic impulses per minute. It is further supposed that the magnets are in the same plane, and the armatures arranged, the first half an inch from the magnet to which its surface is exposed; the second, one inch; the third, one inch and a half, and so on throughout the series; so that, when the whole six destined for either force pump have performed their functions, they shall have traversed a space of three inches. Now it is clear that, if each of these sets of magnets be subjected to 300 impulses per minute, we shall cause each to pass through a space of 75 feet, or collectively 150, which, by construction, will cause the crank-rod to pass through the same distance; and it is thus demonstrated *that, by means of the intervention of hydraulic machinery, twelve magnets will perform the same duty as two hundred and forty magnets without it.*

Were it not, Sir, for the fear of intruding too much upon your space, I could state other most important practical advantages arising from the application of the whole of my invention in its integrity; but the above will, I hope, suffice to answer the end for which it is sent you.

It is indeed to be regretted that an agent so powerful in its nature, so simple in its application, so economical in its production, and so universal in its adaptations, should be suffered to remain unproductive. The most monstrous deviations from physical truth, the most ludicrous applications of mechanical devices excite the enthusiasm of sanguine ignorance; and the bugbear of perpetual motion itself sounds the *bathos* of the capitalist's pocket, whilst a subject truly deserving of national support is, in this country at least, relinquished to the inadequate fostering of those who, though capable of developing its principles and pointing out its practical bearings, are totally unprepared to cope with those mysterious underworkings which are the peculiar province of the man of business and the capitalist.

Had the Government of Great Britain followed the example of the Emperor of Russia to Jacobi, more recently of the United States to Professor Page, and, still more recently, of the Emperor Napoleon, we might now have been furnished with an effective but inexpensive fleet of gun-boats of 10-horse power, with slight draught of water, which, in our present righteous war, would be of inexpressible advantage where larger craft would be useless; acting, when not so employed, as most valuable auxiliaries as tug-boats for placing the sailing men-of-war in their position; and, for my own part, I can truly say, that nothing would afford me greater pleasure than to be called upon, either by the Government of England or France, to render every assistance in my power for so important an object.

I am, Sir, yours, &c.,

GEO. KEMP, M.D. Cantab.

Foulon-terrace, Guernsey, April 13th, 1854.

P.S. A clerical error at p. 482 of No. 1506, gives July 3rd, 1852, as the date of the enrollment of my specification, instead of January 3rd; as, however, this number of the Magazine was published on the 19th of June, the error corrects itself.—G. K.

ELECTRO-MAGNETS.

To the Editor of the Mechanics' Magazine.

SIR,—The subject of electro-magnetism is at present in a very undeveloped state, and many of us experimenters probably are going over the same ground as each other, thereby wasting both time and money. May I be allowed to suggest that, if private individuals would forward to you for publication the results of their researches, they would mutually help each other, and confer lasting benefits on scientific men generally.

I am, Sir, yours, &c.,

ELECTRO-MAGNET.

THE INVENTION OF THE SCREW-PROPELLER.

To the Editor of the Mechanics' Magazine.

SIR,—My attention has just been called to a letter in your Magazine of the 25th ult., in which your correspondent, "T. D. L.," assigns the merit of the invention of the screw propeller, in the first instance, to an English engineer, said to have been in the pay of the King of Oude, in 1824-25; and afterwards to the late Major Du Vernet, of the Royal Staff Corps, about the year 1819; concluding with an insinuation to the effect that I had been guilty of an act of injustice towards the orphans of that gallant officer, by appropriating to myself the credit of being the original inventor of the system of screw propulsion.

Now, Sir, as it is so well known that I am not, and that I never professed to be entitled to that honour, it is needless to discuss the point with your correspondent further than (for his satisfaction and that of the Du Vernet family) to refer him to Bourne's "Treatise on the Screw Propeller," wherein he will find that Leupold, as early as 1724, in his "*Theatrum Machinarum*," gives the accompanying drawings of several arrangements of the Archimedean screw, almost identically the same in form as those on which I experimented in 1836, and which, under certain modifications, are the same as those now in use. He will also find described, with illustrations, no less than twenty-one plans (nearly all patented), by twenty-one different persons, for propelling vessels, between the years 1752 and 1836 (the date of my own patent), more or less similar to the propellers of the present day; thereby showing, most unequivocally, that however original the idea might have been in the minds of Major Du Vernet and his friends, it clearly was not so in reality.

This being the case, it is not my intention to enter into any fresh controversy on the subject; but, with the view to remove any false impressions that your readers may have received from a perusal of Captain Du Vernet's letter (quoted by "T. D. L."), I request that you will do me the favour to insert in an early Number of your Journal the enclosed correspondence (which appeared in the *United Service Gazette*, upwards of ten years ago) between myself, Major White, and Commander Flemming, on the subject of Colonel Sir James Colleton's claims in favour of his late friend Major Du Vernet. To this correspondence I have nothing to add, beyond my assurance that Major White did not do me the justice to reply publicly to my letter in the *Times* of the 2nd of November, 1844; but that he, in a private note to myself, which I have unfortunately lost, admitted the probability of his having been misinformed as to my cognizance of Major Du Vernet's experiments. In taking leave of the foregoing subject, I think it right to state, that the canal on which Major Du Vernet's experiments are said to have been made, at Hythe, is Government property—with high ramparts on the inland side, and the right of access to certain parts of the other side, was (at least in former days) under the control of the military authorities of the place—and as I can well understand the secrecy with which such experiments would be conducted, it does not appear difficult to account for my late father's ignorance of the gallant Major's invention, or that of many other most respectable inhabitants of the town, whom I have questioned on the matter.

I am, Sir, yours, &c.,

F. P. SMITH.

Blackheath, April 17, 1854.

[We regret that we have not space for the insertion of the engravings and the correspondence referred to in Mr. Smith's letter. At the same time, we think their publication scarcely necessary, since no important facts are added to those already published in the letter quoted by "T. D. L.," which certainly fail altogether to prove that Mr. Smith was in any way indebted for his invention to Major Du Vernet's experiments. The following extract from Mr. Smith's reply to Colonel Colleton's letter is, however, important:

"The idea of using the screw as a propeller is at least a century old, and within that period has had its hundred votaries, each in turn nursing it as the offspring of his own fertile imagination, until compelled, by failure of repeated trials, to abandon it in disgust. Of such propositions and attempts, however, *I had never heard or read at the time I first conceived the project myself*, in 1834; but, on the contrary, until after the date of my patent, in 1836, I as conscientiously believed myself to be the first discoverer of the use of the screw for the purposes of navigation, as did Archimedes himself for those to which he applied it, and for which he is so justly famed.

"To reply in detail to the gallant Colonel's letter, would occupy more space than I feel warranted to ask for in your valuable columns. But I have no hesitation in stating, for his satisfaction, and that of Lieutenant Du Vernet's friends, that I am, as he suggests, a native of Hythe; and that, in the year 1818, being then eleven years of age, I left home for the usual course of education, until the latter end of 1824, when I immediately commenced my commercial career. I will state further, that I never saw or even heard of the plans and models of Lieutenant Du Vernet, mentioned by Colonel Colleton, until about four years ago, when the *Archimedes* was making one of her trips in the English Channel; on which occasion Mr. Alexander Swan, of that place, spoke of them to me; and as the gallant Colonel has also surmised that my father might have had some knowledge of them, I beg to assure him that such is *not* the case, as testified under his own hand in a letter which I received from him yesterday, in answer to my inquiries upon *that* subject, and a copy of which is inserted below.

"I feel bound to admit, on the faith of Colonel Colleton's statements, that Lieutenant Du Vernet is entitled to the credit of a prior conception of the idea of screw propelling, although, like its predecessors, from some cause or other, it never made its appearance in public. I may, therefore, with all possible deference to your gallant correspondent, rely so far on his liberality as to presume that if I am not the original *inventor* of the screw, he will at least award to me the merit of being the first *to apply* it in such a form and manner as to make it practically useful."

We think the foregoing is quite sufficient to set the matter at rest.—Ed. M. M.]

PROPULSION BY JETS OF WATER.

To the Editor of the Mechanics' Magazine.

Sir,—The subject of propelling vessels by jets of water has again been brought into public notice by the reading of Mr. Clark's paper upon Ruthven's Propeller, at the Institution of Civil Engineers.* The idea is by no means a modern one, and has had many patrons. Since Mr. Ruthven first commenced his experiments, some fifteen years ago, more than half a dozen parties have patented this mode of propulsion. Notwithstanding the length of time that Mr. Ruthven has been engaged upon this matter, no practical evidence has yet been given whereon to ground a belief that this mode of propulsion can ever be advantageously resorted to. An attempt to propel the steam floating fire-engine by means of its jets has not been attended with much success; the best results have been obtained with a jet one and a half inches in diameter, issuing under a pressure of about 90 lbs. per square inch, the speed of the boat ranging from 3½ to 4½ miles per hour. The jet was in this case obtained from the fire-engine pumps, which are stated by the Rev. H. Moseley (in the Jurors' Reports, Exhibition, 1851,) upon the authority of some experiments conducted by M. Morin, "to be the worst machines, considered in a mechanical sense, as a means of producing a given result with the least possible expense of power. That the amount of power *lost* in lifting and forcing pumps (such as *fire-engines*, &c.,) amounts to *from 55 to* 80 *per cent. of the whole;* so that of the work done by the motive power to drive the pump, only 45 per cent. in the best, and 18 per cent. in the worst pumps, is found to be yielded." In Ruthven's, as in some other plans subsequently patented, a centrifugal pump is employed. A series of experiments made at the Exhibition with centrifugal pumps, showed Mr. Appold's to be the best of this class, as working under the most favourable conditions. In these pumps, the velocity with which the wheel must be driven depends upon the height to which the water is to be raised. Beyond a certain height this velocity is practically unattainable; but long before this limit is reached it becomes inconsistent with an economical application of the power which drives the pump. From the experiments made, it appeared that a speed of about 800 revolutions a minute, lifting the water to nearly 20 feet high, gave the best result, the ratio of power being at the maximum 0·680. As a propelling force, this gives a pressure of about 10 lbs. per square inch, by no means adequate to produce more than a very moderate rate of speed in a vessel, even with a large jet.

It would, therefore, appear that this mode of propulsion can never be applied economically or advantageously, nor to produce any considerable speed. Even in the floating fire-engine, where a great pressure is readily obtained by the steam-worked pumps, propulsion can only be effected by an enormous expenditure of power, and even then only a very moderate speed can be obtained. As the requirements for this machine are not very frequent, the expenditure of power might well be overlooked; but it is very desirable to get as high a speed of travelling as possible, higher, I fear, than can be obtained from a jet.

I am, Sir, yours, &c.,

William Baddeley.

13, Angell-terrace, Islington, April 7, 1854.

* Vide *Mech. Mag.*, p. 294.

MATHEMATICAL PERIODICALS.

To the Editor of the Mechanics' Magazine.

Sir,—I have been prevented from seeing the last letter of Mr. Wilkinson until now. It was not my intention to trouble you again; but I hope to be excused while I furnish you with an errata to his weak defence.

It is satisfactory to find that he has made some acknowledgment at last, even much more than I expected. "The extracts from my letters," he says, "are correct *as far as they go.*" Now, *as far as they go*, they go the whole length for which I intended them; viz., to show that he did not hesitate to do that for which he condemned others. I have not yet received any letter from Mr. Wilkinson, stating that he had solved questions I. to XII. and XIV., nor did he ever

mention to me that he did not intend to try questions XIII. and the prize, "Since they belonged to subjects that he had not much studied;"—the extent of a village schoolboy's education.

He did not enclose to me his solution of the "neck-and-neck race" question, till I had furnished him with mine, at his own request. He then offered a solution, which he calls an improvement on one of mine; but he entirely loses sight of the "Doctrine of Limits," and substitutes a piece of "quackery" which cannot be easily defined. I corrected this mistake, and heard no more of him till he commenced his attack in the *Mechanics' Magazine*.

Still the "system of mutual exchange" seems to be "a thorn in his side." I am at a loss to conceive how a letter from a common friend can assure *him* that what I have said is "a pure fabrication of my own." If the thing were not so, why not be assured without it? This common friend of ours (at least he was our common friend) told me, not once, or twice, but many times, that they had put their solutions together; and I find, on inquiry, that he has said the same to others as well. The first time he told me that they had put their solutions together, both answered exactly the same questions. This looks *rather suspicious*; amounting almost to coincidence!

I am, Sir, yours, &c.,
S. Tebay.

Preston, April 15, 1854.

Drawing for Schools. By Thomas Tate, F.R.A.S *Drawing-Book for Little Boys and Girls.* By the same Author.

The first of these is a very sensible and useful treatise, containing expositions of a method of teaching drawing in schools; an explanation of Depuis' system of drawing from models; the principles and practice of outline and perspective drawing; together with numerous illustrations, and upwards of 130 drawing exercises of geometrical figures and familiar objects. The subject is treated with accuracy and skill, and the book is exceedingly well got up. The only fault we have to find is with its title. It is not properly a Drawing-book *for* Schools, but an illustrated treatise on the teaching of drawing, addressed apparently to those to whom the tuition of pupils is entrusted.

The "Drawing-Book for Boys and Girls" is a separate edition of the exercises contained in the former volume.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Johnson, John Henry, of Lincoln's-inn-fields, Middlesex. *Improvements in machinery or apparatus for cutting paper.* Patent dated September 28, 1853. (No. 2222.)

The machine described by the patentee consists of a stand containing a sliding platform, upon which the paper to be cut is compressed by a suitable pressing-screw, the knife or cutter being carried in a moveable frame and made to traverse longitudinally and simultaneously with the platform, but in an opposite direction, so that the paper is drawn in one and the knife or cutter in an opposite direction, in order to effect greater accuracy and steadiness in the cut. The platform upon which the paper rests is caused to move also in a direction at right angles to its traverse by a fixed screw and nut, and a suitable winch-handle.

Newton, William Edward, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for cutting metal or other substances.* (A communication.) Patent dated September 18, 1853. (No. 2225.)

This invention consists "in so mounting the fixed and moveable separating blades as that their cutting edges shall be in the same line, and one so placed above the other as not to come in contact, much less overlap each other; by which means a perfectly straight square and smooth edge may be cut, without the least warping or twisting, and with great diminution of power."

Labat, Jean Alexandre, junior, of Bordeaux, France. *An improved system of stoppering vessels and bottles.* Patent dated September 28, 1853. (No. 2227.)

In this invention a collar is formed on the stopper, which adjusts itself to the neck of the bottle or vessel, and which has a fillet round its inside, which fits into a groove formed in the swelling of the neck. This collar is chased with screw-threads, so as to offer a great resistance in the direction of the axis of the neck. The collar is also cut so as to allow of its being put on or taken off the bottle. The neck projects a little beyond the collar, and the hollow space thus left is used for luting.

Lesage, Michel Ovide Bernard, of Paris, France. *Certain improvements in hydraulic engines.* Patent dated September 28, 1853. (No. 2228.)

Claim.—"Transmitting power at any distance and in any direction, by two oscillating columns, or a continuous current of water substantially, as set forth, and the application of this transmission of power to pumps for greater depths than that corresponding to the atmospheric pressure."

PHILLIPS, JOHN, of Birmingham, Warwick, manufacturer. *Improvements in shaping metals.* Patent dated September 29, 1853. (No. 2229.)

Claim.—The shaping of plates or sheets of metal into forms such that their sections somewhat resemble a circle in contact with a straight line, or any modifications of such forms, by means of arrangements of dies or pressing-tools, and of rolls.

RAUX, FRANÇOIS JULIEN, engineer, of Montmartre, France. *Improvements in railway brakes.* Patent dated September 29, 1853. (No. 2231.)

The inventor secures to the underside of every carriage, engine, and tender, between the axles, a pressure-cylinder, in which work two pistons or plungers, serving, when they are forcibly separated, to press the brake-blocks against the peripheries of the wheels, and thus check the motion of the carriage. The separation of the pistons may be effected by air, steam, or water-power, as judged most convenient. After the power has ceased to be exerted, the pistons are restored to their former positions by means of springs.

GRIFFITHS, JAMES, of Wolverhampton, Stafford, engineer. *Certain improvements in steam engines.* Patent dated September 29, 1853. (No. 2232.)

Claims.—1. "A method of relieving the slide from the pressure, or from a portion of the pressure exerted thereupon by the steam in the valve-chest, by causing the slide to fill the whole depth of the valve-chest, and by the use of a packing or elastic cushion of vulcanized India-rubber inserted between the moveable parts or divisions of such slide, for the purpose of pressing the upper and inferior faces or surfaces thereof against the inner corresponding surfaces of the valve-chest, and of preventing the access of the steam to the interior of the slide." 2. An arrangement whereby a passage is opened through a slide constructed as above, and through the cover of the valve-chest for the discharge of the exhausted steam.

KENNARD, THOMAS WILLIAM, of Duke-street, Adelphi, Middlesex, civil engineer. *Improvements in constructing piers and foundations under water.* Patent dated September 29, 1853. (No. 2233.)

Claim.—The constructing piers and foundations under water, by means of caissons or framings in combination with screw or other piles passing through guides in the caissons or framings.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *Improvements in treating certain exotic plants for the production of a fibrous substance, known in commerce by the name of vegetable silk.* (A communication.) Patent dated September 30, 1853. (No. 2235.)

As an example of his method of preparing textile plants, the patentee says:—To obtain the best result from the *agava*, its fibres must be extracted from the leaves of the plant with care, and completely disengaged from the ligneous matter surrounding them by any suitable means, and then dried. When dry the fibres are slightly and briskly shaken, and rubbed several times between the hands, and the fibrous matter is placed in a metallic basin that is afterwards filled with pure water, which is heated by a stove to a temperature of about 110° or 120° Fahr., which must be kept up until the matter left in the bath has lost its stiffness, when it is placed under the machine in which it is manufactured.

WILLIS, JAMES, of Wallingford, Berks, harness-maker. *Improvements in gig-harness.* Patent dated September 30, 1853. (No. 2236.)

Claims.—1. Constructing the cantle and seat separate from the saddle, and securing it thereto. 2. Securing the leather-roll or facing to the leather flaps of the saddle, instead of to the pad, as heretofore. 3. The application of a sliding-tongue to the buckle used in harness, and a peculiar configuration of the tongue, whereby it is better adapted to receiving strain from a strap.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in apparatus for throwing out ropes or lines for the better preservation of life and property.* (A communication.) Patent dated September 30, 1853. (No. 2237.)

This invention consists in fitting a capsule of caoutchouc or a combination of caoutchouc with some other material, such as gutta percha, to the muzzle of a cannon or other fire-arm. The cord to be conveyed is attached to this capsule, and is suitably coiled, to allow of its being readily run off. On the discharge of the fire-arm the ball will enter a small chamber in the capsule, and carry it with the end of the life-line to the object.

BRISCO, ROBERT, of Low Mill-house, St. Bees, Cumberland, Esq., and PETER SWIRES HORSMAN, of St. John's, Beckermet, same county, gentleman. *Certain improvements in machinery for heckling flax, hemp, china grass, and other fibrous substances.* Patent dated September 30, 1853. (No. 2239.)

Claims.—1. The use of heckle-bars with heckles of different degrees of fineness, arranged one above the other in the same tool. 2. The use and application of brushes, or other similar contrivances, for clearing the heckles of the tow, such brushes or contrivances being adapted to the heckle-

shafts, and so arranged that each brush is made to act upon and clear the heckles of the shaft immediately above it.

TAYLOR, JOHN, of Prince's-square, Middlesex, engineer. *An improvement in the treatment or preparation of skins.* (A communication.) Patent dated September 30, 1853. (No. 2240.)

Claim.—The employment of the brains of animals as a substitute for the yolks of eggs, as now used in the preparation of skins.

COATES, CHARLES, of Sunnyside, near Rawtenstall, Lancaster, mechanic. *Improvements in coupling pipes and other articles, and in apparatus connected therewith.* Patent dated October 1, 1853. (No. 2242.)

This invention consists "in placing rings of lead, or other suitable metal of an oval, circular, or angular section between the flanges of pipes or other articles, and in bolting the said flanges together, so as to compress the metal ring between them, thereby forming an air, steam, or water-tight joint; also in the apparatus for manufacturing the said rings."

DAVIES, EDWARD, of Bradford, York, machine-maker. *Improvements in carrier combs to be used in combing wool, cotton, silk, flax, or other fibrous substances.* Patent dated October 1, 1853. (No. 2244.)

This invention consists in employing a flexible or articulated comb, and in so actuating the same that it shall form a straight line whilst taking the wool or other fibrous substance from the "nip," and assume a curved form whilst donning or placing it on to the circular comb.

MERLAND, SAMUEL, of Castlewellan, Down, Ireland. *Certain improvements in machinery for preparing linen yarn.* Patent dated October 1, 1853. (No. 2248.)

In this invention the spinning bobbins are placed on a creel or frame, and the yarns are first passed round a steam cylinder, and then conducted to and wound upon the bobbins, which are carried to the warping and weft winding machinery.

AMBLER, ISAAC, of Manningham, near Bradford, York. *Improvements in preparing or combing wool and other fibrous substances.* Patent dated October 1, 1853. (No. 2249.)

This invention consists in causing a sliver of wool or other fibres to be moved at intervals on a surface or between surfaces, either perforated, or so formed as to admit of points or teeth passing through or between them, and entering into the fibres.

HALLIWELL, ROBERT, of Boulton-le-Moors, Lancaster, mechanic, and WILLIAM JOHNSON, of Farnworth, same county, manager. *Improvements in machinery for spinning and doubling cotton and other fibrous substances, and for grinding cards.* Patent dated October 1, 1853. (No. 2251.)

Claims.—1. Certain improved machinery for effecting the backing-off and winding-on motions of hand mules, and other similar machines by means of bevel wheels, &c. 2. Machinery for effecting the same motions by means of a weighted cord, strap, or chain, &c. 3. Machinery for effecting the same motions by means of spur-wheels and pinions, &c. 4. The application of two rollers covered with emery, acting simultaneously on the card-teeth of one or two rollers.

BROWN, WILLIAM, of Bradford, York, mechanic. *Improvements in apparatus used in washing wool and other fibrous material.* Patent dated October 1, 1853. (No. 2252.)

Claims.—1. Combining together several cisterns or troughs, and their apparatus, to work in combination for washing wool and other fibrous material in the raw state, as described. 2. The washing of wool and other fibrous material in the raw state in pure water, or water very slightly charged with soap between successive scouring processes.

DWYER, MICHAEL, of Unity-place, Samuel-street, Woolwich, Kent, Commander, R.N., and JAMES BROWN, of Bridge-terrace, Mile-end, Middlesex, machinist. *An improvement in anchors.* Patent dated October 3, 1853. (No. 2253.)

This invention relates to those anchors only whose arms work on axes, and it mainly consists in forming a semi-circular projection on the inner part of the arm, which projection contains an elongated hole, and the metal at the upper part of the hole pressing down against an inner bolt on the shank, forces the under part of the arm into the earth, thereby giving the anchor better holding properties.

BAXTER, JOHN WYNCOLL, of Mistley, Essex, ironmonger. *Certain improvements in shipbuilding.* Patent dated October 3, 1853. (No. 2254.)

According to this invention the bottom of the fore part of the ship "is to be formed by a straight line inclining downwards from about half the height of the stern to the utmost depth of the centre or widest part of the vessel, the keel following the same, or nearly the same straight line;" the after part is to be formed as usual, and the upper parts of the transverse sections are to be circular arcs.

THOMPSON, WILLIAM JOSEPH, of North Shields, Northumberland, Russian vice-consul. *Improvements in heating reverberatory and other furnaces.* (A communication.) Patent dated October 3, 1853. (No. 2255.)

In this invention the bars of the furnace are formed of flat plates, and "are placed

parallel to each other, but so as to form an inclined grating. By this arrangement small coal can be burned without falling through between the bars."

LEADBETTER, JAMES, of Halifax, York, brazier, and WILLIAM WIGHT, of the same place, plumber. *Improvements in machinery or apparatus for raising fluid and solid substances.* Patent dated October 3, 1853. (No. 2257.)

The object of this invention is to raise material at each stroke of the piston, and the invention consists in the peculiar application of an air chamber that is connected to and moves with the moving part of the pump.

WILDING, WILLIAM HENRY, of Chesterfield-street, Middlesex, gentleman. *Improvements in propelling machinery.* Patent dated October 3, 1853. (No. 2258.)

A full description of this invention was given in No. 1600 of our Magazine.

JACKSON, PETER ROTHWELL, of Salford, Lancaster, engineer. *Improvements in machinery for manufacturing hoops and wheels.* Patent dated October 4, 1853. (No. 2261.).

The main feature of this invention consists in the employment of three pairs of rollers supported in bearings in a frame, the outer ends of these bearings being left free, so as to permit the introduction of the hoops or articles to be operated upon between the rollers; a small portion of the end of each roller is tapered slightly, so as to facilitate such introduction, the rollers having adjusting screws to set them to their required positions.

PEACE, WILLIAM, of Haigh, near Wigan, Lancaster, mining engineer. *Hewing and excavating coal, cannel and other mineral strata and substances, by certain machinery and appliances thereto.* Patent dated October 4, 1853. (No. 2262.)

Claim.—The combination of a moveable lever and wheels with an endless chain, band, or strap furnished with suitable cutters, the whole being mounted and receiving motion in any convenient manner for the purpose of hewing or excavating coals.

JORDAN, HENRY JACOB, of Berner's-street, Middlesex, gentleman. *An improved medicine for the cure of venereal affections, which he denominates the "Treisemar."* (A communication.) Patent dated October 4, 1853. (No. 2263.)

The following recipe is for one dose of the patentee's medicine; the dose is to be taken four times a day. Take of powdered henbane leaves one grain; of compound tragacanth powder one drachm; of nitrate of potash six grains; of tartrate of potash one twenty-fourth part of a grain; and of bicarbonate of soda six grains. These ingredients are to be pounded and mixed intimately together, and afterwards combined with a sufficient quantity of sugar to make a lozenge. Instead of taking the medicine as a lozenge, the ingredients may be dissolved in boiling water, and taken as a draught when cold; or the lozenge itself may be so dissolved and taken.

GOSSAGE, WILLIAM, of Widnes, Lancaster. *Improvements in obtaining certain saline compounds from solutions containing such compounds.* Patent dated October 4, 1853. (No. 2269.)

This invention consists of an arrangement of apparatus for obtaining saline compounds of soda from solutions produced by the lixiviation of "soda ash," or "black ash;" and sulphate of soda, from solutions containing such saline compounds of soda, in which arrangement the evaporation of the water and the consequent separation of saline compounds from such solutions is caused by streams or bubbles of air, drawn through a column of them, elevated in a vessel by the exhaustive action of an air-pump or other exhauster.

NORTON, JAMES LEE, of Ludgate-hill, London, gentleman. *Improvements in instruments or apparatus for measuring and indicating the distance travelled by carriages, and in the means of transmitting motion thereto from the running wheels.* Patent dated October 4, 1853. (No. 2270.)

In this invention the distance is registered by a counting apparatus, which is acted upon by one of the running wheels through the intervention of a column of air or water, which is made to act upon a flexible diaphragm connected to the counting apparatus, and actuate a lever or click, by which the gearing of the counting apparatus is moved. The communication between the axle or running wheel and the counting apparatus is effected by means of a tube, in which the air or water is contained.

TURIFF, ALEXANDER, of Paisley, Renfrew, North Britain, engineer. *Improvements in retarding apparatus for the prevention of accidents on railways.* Patent dated October 5, 1853. (No. 2272.)

Claims.—1. The mode of bringing railway brakes into action, by means of wedges or inclined surfaces actuated from the buffers or buffer connections. 2. The use of wedges or inclines for pressing frictional brake surfaces into action. 3. The mode of throwing brake movements out of action, by means of traversing pullies or stops, as described. 4. The use of angular jointed links for connecting the carriages, &c.

WRIGHT, JOHN, of Rochester, Kent, civil engineer. *Improvements in apparatus to facilitate the landing and embarking of passengers from steam boats and other vessels.* Patent dated October 5, 1853. (No. 2273.)

The invention consists in constructing on the bank of a river an inclined way, on which a carriage on wheels is enabled to move freely up and down the wheels running in a chase or between guides, the carriage carrying the landing-stage, and being made buoyant, so as to float on the water as it rises and falls.

WILSON, JAMES THOMSON, of Falkirk, North Britain. *Improvements in the manufacture of alum.* Patent dated October 5, 1853. (No. 2274.)

Claim.—The use of muriate of potash or muriate of ammonia in connection with ammoniacal liquor (distilled or otherwise) in the manufacture of alum from shale, by means of sulphuric acid.

BETJEMAN, HENRY JOHN, of New Oxford-street, Middlesex. *Improvements in apparatus for fixing capsules on the necks of bottles and other vessels.* Patent dated October 5, 1853. (No. 2275.)

In this invention several cords are used, each independent of the other; one end of each is made fast to the upper part of the apparatus, the other end being connected to a spring, and each cord being at the same time capable of being pulled on by a treadle or otherwise. There are two sets of such cords, and those in each set are bent in opposite directions, by which means a tubular eye or opening is formed, into which the neck of a bottle or other vessel, having a capsule on it, is passed, when, by pulling on the several cords, they close on the capsule, and cause it to assume the figure of the neck.

WORTH, SAMUEL LEAKE, of Oxford-street, Middlesex, brush-maker, and AGMOND VISHIN VESEY CANAVAN, of Fitzroy-street, Middlesex. *An improved polishing and brightening surface.* Patent dated October 5, 1853. (No. 2277.)

This invention consists in forming a band or belt of strips of leather, placed with their edges side by side, and pressed closely together.

MASON, JOHN, of Rochdale, Lancaster, machinist. *Improvements in preparing cotton for spinning, and in machinery or apparatus for effecting the same.* Patent dated October 5, 1853. (No. 2279.)

Claim.—The application of artificial heat to cotton previous to or during the processes of willowing or scutching, or others used in lieu of these.

TIZARD, WILLIAM LITTELL, of Aldgate, London, brewers' engineer. *Improvements in thermometers and other like indicators.* Patent dated October 5, 1853. (No. 2280.)

Claim.—The substitution of sheet-talc for glass tubes in the construction of thermometers, steam-pressure gauges, and other like mercurial indicators.

MILNER, JAMES, of Stratford, Essex engineer. *Improvements in steam-engines.* Patent dated October 6, 1853. (No. 2281.)

Claim.—"The constructing steam-engines with two cylinders, whose pistons are in connection with two cranks placed at right angles to each other, or which are otherwise so arranged that when one piston is at the end of its stroke, the other piston may be at or near to the middle of its stroke; such cylinders being provided with valves and valve-gear so arranged as that the first cylinder may be about half filled with steam, and that a communication may then be opened between that end of the first cylinder so filled with steam and the second cylinder, such communication remaining open during or nearly unto the end of the stroke of the second piston, and until the first piston has made one half (or thereabouts) of its return-stroke, when the steam which has thus been expanded is discharged into the atmosphere or into the condenser."

SCHÖNEMANN, JULIUS, of Great Portland-street, Middlesex. *New constructions of weighing machines.* (A communication.) Patent dated October 6, 1853. (No. 2282.)

This invention consists—1. In the application and combination of certain connecting links and stay links for ensuring the parallelism of the plane of the platform in all its positions. 2. In the application of a moveable bar connected by a link with the beam. 3. In a method of suspending the scale or platform of the weighing machine from a horizontal axis upon which it is at liberty to vibrate, the axis being fixed to a portion of the machine which is in direct connection with the beam.

CARY, JOSEPH HENRY, of Norwich, pianoforte-action maker. *An improved pianoforte action for upright pianofortes.* Patent dated October 6, 1853. (No. 2283.)

Claim.—"Accomplishing by *one* thing, called an escapement-rod, the same objects that have hitherto been sought to be obtained by the employment of *three* things, named the hopper, the lever, and the sticker, thus dispensing with the use of hoppers and levers."

CASTRO, MANUEL FERNANDEZ DE, of Madrid, Spain, mining engineer. *Improved means of preventing accidents on railways.* Patent dated October 6, 1853. (No. 2285.)

This invention consists of an arrangement by means of which immediately a train arrives upon the same line as another, an electric apparatus shall make a signal, and a lever thrown out by an electrical mortar will disengage a weight, that will thereupon cut off the steam and disengage a stop finger or catch on any one of the carriages, and thus free it, and the carriage thus freed

will, by its weight, produce the same effect upon the next carriage, and so on until the train is stopped of itself.

HARGROVE, ALFRED ELY, of York, printer, and RALPH RICHARDSON, of Hartlepool, Durham, engineer. *Improvements in machinery or apparatus for printing.* Patent dated October 6, 1853. (No. 2286.)

The object of this invention is to communicate to the table on which the form of type is placed a reciprocating motion by more simple means than those usually adopted. This is effected by means of an eccentric, or cam-wheel, or drum on the periphery of which is a groove or feather, in or against which works a pin or pins attached to the under side of the travelling-table.

GODDARD, HENRY, of Castle-gate, Nottingham, kitchen-range manufacturer. *Improvements in stoves and kitchen ranges.* Patent dated October 6, 1853. (No. 2287.)

The principal part of these improvements consists in the application of a moveable or adjustable blower behind and above the fire in combination with a ventilating apparatus, communicating with the chimney-flue, by which arrangement a close or semi-close stove or kitchen range may be readily converted into an open fire-place, or when it is used as a close stove, the vapour may be readily carried off to the chimney.

GEEVES, WILLIAM, of the Caledonian Mills, New Wharf-road, Caledonian-road, Middlesex. *Improvements in the manufacture of bricks.* Patent dated October 6, 1852. (No. 2288.)

Claim.—The manufacture of bricks by combining clay or brick-earth immediately before moulding with saw-dust or other matters, which act as dryers or absorbents of moisture; and also a combination of apparatus for moulding perforated bricks.

RUBERY, JOHN, of Birmingham, Warwick. *Improvements in the manufacture of umbrella and parasol furniture.* (A communication.) Patent dated October 6, 1853, (No. 2289.)

This invention consists in applying zinc to the manufacture of the notches of the runners, and the top notches of umbrellas and parasols.

HOLM, CHARLES AUGUSTUS, of Cecil-street, Middlesex, civil engineer. *Improvements in machinery for raising or propelling elastic and non-elastic fluids.* Patent dated October 6, 1858. (No. 2290.)

Claim.—The application of a screw in combination with curved arms, for the purpose of raising or propelling elastic and non-elastic fluids; and also the application of curved surfaces to the wheel or disc employed, for the purpose of preventing contraction, retardation, or expansion of the fluid in its passage through the wheel.

*** No. 2268 is still under objection, and No. 2284 has not been advertised.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

WAESBERGHE, JOSEPH FERMONT VAN, of Lockereu, Belgium. *The improved manufacture of artificial vinegar.* Application dated September 28, 1853. (No. 2224.)

This invention consists of a vat or vessel for containing the liquid from which the vinegar is to be produced, and of another vessel or basin into which the liquid flows, and from which it filtrates slowly into a double vat beneath, through small holes, which are partially stopped up by ears or spikes of rye or other like grain, or by rolls of suitable permeable material for the purpose of preventing the too rapid passage of the liquid.

ASKIE, THOMAS, of Little Britain, London, pattern-maker. *Improvements in the construction of churns, which improvements are also applicable to other agitating or stirring apparatus.* Application dated September 28, 1853. (No. 2226.)

The object of this invention is to give both a rotary and reciprocating motion to the dasher, and this is effected by means of two bevel wheels, one of which is mounted on an axle which carries a fly-wheel or winch handle, and has adapted to its face a crank pin, which of course rotates with it, and which by means of a connecting rod communicates motion to the vertical shaft of the agitator.

BERDAN, HIRAM, of New York, United States. *A machine for collecting, preserving, and thereby preventing the loss of mercury in the process of amalgamating metals, and for the more perfect and economical washing, separating, and amalgamating of auriferous and other ores.* Application dated September 29, 1853. (No. 2234.)

The inventor states, that in carrying out this invention he employs the attraction which mercury has for itself, aided by mechanical apparatus. He constructs a tub of cast iron and places in the centre of it an upright tube, having attached to its lower part, and at right angles to it, hollow arms, which have narrow slots formed at their ends and on one side.

PLANT, JOHN, of Beswick, Lancaster, manufacturer. *Improvements in the manufacture of textile fabrics.* Application dated September 30, 1853. (No. 2238.)

The first improvement consists in causing the same floating weft thread to pass across the warp twice in the same shed, and in employing a catch-thread in order to bind the said weft after the first of the picks, a single rising-box loom being employed. The second improvement consists in the em-

ployment of a rising box at each side of the loom. Around the upright tube is placed a sleeve which revolves upon it, and to which are attached vertically adjustible wings or slats. The sleeve, with its wings, is caused to revolve by means of a level-driving wheel attached to the main shaft, and taking into wheels on the same level, at proper distance apart, one to the sleeve and the other to the tube.

SUMMERSCALES, JOHN, shuttle-maker, and BENJAMIN BANCROFT, shuttle-maker, both of Keighley, York. *Improvements in shuttles employed in weaving textile fabrics.* Application dated October 1, 1853. (No. 2243.)

This invention consists in the application to shuttles of a fixed spindle and appendages to receive the bobbin, and in forming the shuttle so as to admit the bobbin and allow it to pass out freely.

WOODCOCK, THOMAS, of Pultney-terrace, Islington, Middlesex. *Improved machinery for carving, cutting, chiselling, and engraving.* Application dated October 1, 1853. (No. 2245.)

The inventor attaches a tracing point to a horizontal or vertical lever working upon a moveable joint, and the same lever carries the cutter, chisel, or other tool over the material to be operated upon in one direction, whilst the material and model are made to pass in an opposite direction by the action of sliding beds, on which they rest, being moved by a screw either by hand or machinery.

HENDRY, JOHN, of Glasgow, Lanark, North Britain, brick-builder. *Improvements in ovens and apparatus for baking.* Application dated October 1, 1853. (No. 2246.)

Mr. Hendry's ovens are divided into a number of cells, and each cell is completely closed in from the products of combustion, access being only given to it by an end door outside, for the introduction and withdrawal of the articles to be baked, while the heat from the furnace circulates freely over and between the cells, and the current finally passes off at the top through suitable flues to the chimney.

LETESTU, JEAN MARIE, engineer, of Paris, French Empire. *Certain improvements in propelling ships and vessels.* Application dated October 1, 1853. (No. 2247.)

This invention consists in applying a combination of machinery to ships, by means of which pistons are caused to force water out from the vessel against the exterior water, when they move either outwards or inwards.

DREVELLE, ADOLPHE, of Halifax, York, merchant. *Improved apparatus to be used in connection with looms for weaving.* (A communication.) Application dated October 1, 1853. (No. 2250.)

"This apparatus consists of a cylinder pierced with holes like the usual Jacquard cylinders, but round instead of square, having screws to fill up the holes, according to the ground or pattern required. The wires, instead of being connected with the harness, as in Jacquard looms, serve to give motion to the healds both up and down through the intervention of jacks placed under them."

COLEMAN, JAMES, of South-street, Finsbury, London, manufacturer. *Improvements in the construction of compasses.* Application dated October 3, 1853. (No. 2256.)

This invention consists in constructing compasses which are intended to describe all kinds of geometrical curved figures. The pencil is made to approach or recede from the main leg by means of a regulator; by the ascent or descent of a collar, and by the motion of another leg, which compels the pencil to turn round the main leg, which remains always fixed during the formation of the figure.

JEE, ALFRED STANISTREET, of John-street, Adelphi, civil engineer. *Improvements in the construction of rails for railways.* Application dated October 3, 1853. (No. 2259.)

This invention consists in making the rails each of two parts longitudinally in such manner that the bearing surfaces are undivided, whereby also the parts may be put together so as to break joint, and thus render "fishing" or "fish-jointing" unnecessary.

CROFTS, WILLIAM, of Derby-terrace, Nottingham-park, manufacturer. *Improvements in weaving.* Application dated October 3, 1853. (No. 2260.)

This invention relates primarily to improvements in the machinery patented by the inventor, April 1st, 1853, and consists in using several guide-bars to act upon the warp-threads when producing plain fabrics in place of only two, each of such bars having the compound movements referred to in the previous specification.

NORTON, JOHN, of Cork, Ireland, Esq. *Improvements in firing explosive compounds.* Application dated October 4, 1853. (No. 2264.)

This invention consists in firing explosive compounds by means of mere tensional action upon a piece of cord or a communicating line of any convenient kind. Such a cord is in two pieces, the two contiguous ends being only slightly attached together, whilst the joint is cemented with the composition with which lucifer matches are tipped, or any other such composition.

CROFTS, WILLIAM, of Derby-terrace, Nottingham-park, manufacturer. *Improvements in weaving.* Application dated October 4, 1853. (No. 2265.)

This invention relates to machines previously patented by the inventor, in which

points, sleys, or reeds are used for the beat up; and the present improvements consist in moving the rows of warp-threads from, towards, and past each other for the opening and changing of sheds by means of only one row of guides to guide one row of warp-threads, the other row simply passing over a bar or other plain surface, which, with the beam from which the set of warp-threads passes, has a to and fro movement given to it to assist in the opening and changing of the sheds.

DODGE, JOSEPH THOMAS, of St. Austell, Cornwall. *Improvements in the formation and arrangement of and mode of rigging and working the sails of yachts, ships, and other vessels.* Application dated October 4, 1853. (No. 2266.)

This invention consists in forming the sails, or the upper parts of them, triangular; in so arranging them, that when it is required to shorten sail it may be done by reefing or furling the lower parts to the extent desired; in keeping the sails distended or flat by attachments at frequent intervals to the yards or booms; in means of suspending these upon swivel or centre-pins, to facilitate their movements and stowage as required; and in lacing the sails so as to facilitate the reefing of them.

SMART, NEVILL, of Merton, Surrey, brick-maker. *Improvements in the manufacture of bricks.* Application dated October 4, 1853. (No. 2267.)

This invention consists in making the dies or moulding orifices of brick machines in such manner as to produce a groove or grooves on the upper and under surfaces of each brick to receive the mortar or cement.

HOLMES, JOSEPH, of Portsea, Hampshire, gentleman. *Improvements in soldiers' or mess-canteens, and other articles for containing food.* Application dated October 5, 1853. (No. 2271.)

These improvements consist in so constructing canteens, &c., that they may be carried with greater ease than those now "constructed of a D form, with square corners;" the inventor forming his "of a D form also, but with round corners;" also, in fitting within the body of the canteen a bottle of a corresponding form.

CROFTS, WILLIAM, of Derby-terrace, Nottingham-park, manufacturer. *Improvements in the production of figuring in weaving.* Application dated Oct. 5, 1853. (No. 2276.)

These improvements mainly consist in the application of independent instruments for intercepting and bending various of the warp-threads in their movements along machines of the character described in the specification of a patent granted to the inventor dated 1st April, 1853.

STEVENS, HENRY, of Trafalgar-square, Middlesex, gentleman. *Improvements in the preparation of vegetable substances for the purpose of preserving the same.* (A communication.) Application dated October 5, 1853. (No. 2278.)

The inventor describes, as an example, his method of treating potatoes, in which method the roots, after being well washed and cleaned from all dirt, are first steamed with their skins on, and then mashed and submitted to a current of warm or heated air for the purpose of drying the farinaceous parts of the root, during which process the skins are removed by means of separating apparatus, and when the pulp is quite dry it is fit for the market.

ELLINS, GEORGE, of Droitwich, Worcester, gentleman. *New or improved machinery for thrashing or separating the stem and husk from the grain or seed of wheat, barley, flax, and other plants.* Application dated October 7, 1853. (No. 2291.)

This machinery consists of a table, supported on a horizontal axis, on which it is capable of revolving. The faces of the table are covered with transverse flutes or corrugations made of laths of wood or other material, the laths being supported on an elastic bed so as to be capable of yielding, and having different depths; the plants are put upon this table, a flap is placed upon them, and a corrugated roller is then caused to roll, and press upon the ears.

ELLIS, WILLIAM, of Sheffield, York, artist. *Improvements in the manufacture and in the ornamenting of China, porcelain, and pottery wares.* Application dated October 7, 1853. (No. 2292.)

This invention consists in ornamenting China and pottery wares generally with metal or alloys of metal deposited by the electro-type process.

PROVISIONAL PROTECTIONS.

Dated February 24, 1854.

456. Auguste Edouard Loradoux Bellford, of Castle-street, London. Improvements in turn-tables for railways. A communication.

Dated March 18, 1854.

649. Perceval Moses Parsons, of Duke-street, Adelphi, Middlesex, civil engineer. Certain improvements in the construction of the permanent way of railways.

Dated March 20, 1854.

657. Joseph Horton, of Shoreditch, boiler-maker, and Richard Jenkin Polglase, of Stepney, Middlesex, engineer. Improvements in the construction of ships' boilers, girders, tanks, gasometers, and other like structures or vessels.

Dated March 27, 1854.

705. Arthur Edward Forty, of Kennington, Surrey, stationer, and William Haynes, of New Kent-road, Surrey, leather-dresser. A new composition of materials suitable for mouldings, and for most purposes for which leather and gutta percha have been or may be employed.

707. Alexander Prince, of Trafalgar-square, Middlesex. An improved method of hardening fatty and oily matters employed in and for the manufacture of candles. A communication.

709. James Alexander Manning, of the Inner Temple, London, Esq. Improvements in the treatment of sewerage.

Dated March 28, 1854.

711. Joseph Hipkiss, of Birmingham, Warwick, tool-maker. A new or improved dress-fastening.

713. Henri Adolphe Archereau, of Paris, France. Certain improvements in galvanic batteries.

715. John Roberts, of Bruton-street, Bond-street, Middlesex, doctor of medicine. Improvements in the construction of cabriolets.

717. William Hähner, of Leghorn. Improvements in the manufacture of muriatic and sulphuric acids. A communication.

719. William Hähner, of Leghorn. Improvements in the manufacture of alkaline sulphites, and in purifying and treating gases. A communication.

Dated March 29, 1854.

721. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the construction of millwork, and in the mode of driving the same, part of such improvements being applicable for transmitting motive power generally. A communication from Henri Fortuné Negrier, of Toulouse, France.

723. Robert Henry Causton, of Battersea, Surrey. Improvements in the manufacture of millbands.

Dated March 30, 1854.

725. Jean François Lucevilliard, manufacturer, of Dijon, France. Improvements in fastening or sustaining to the body the various parts or objects of body clothing, equipment, and harnessing.

726. William Corrall, of Albert-street, Mile-end, Middlesex. Constructing the several parts of vehicles of hollow metal tubing or pipes.

727. William Johnson, of Lincoln's-inn-fields, Middlesex, civil engineer. Improvements in galvanic, electric, and magnetic apparatus. A communication.

728. William Tucker, of Old Brompton, and William Adams, of Kensington, Middlesex. Preventing the escape of fuliginous smoke from shafts and flues.

729. Elmer Townsend, of Massachusetts, United States of America. An improvement in machinery for sewing cloth or other material. A communication from Alfred Swingle, of Massachusetts.

730. Henry Cowley, of St. Giles, Oxford, builder. The manufacture of bricks, either solid, moulded, or perforated, by improved machinery.

731. John Sandys, of the Electric Telegraph Works, Upper Whitecross-street, Middlesex. Improvements in electric telegraph instruments.

732. Thomas Russell Crampton, of Buckingham-street, Strand. Improvements in crushing, washing, and separating ores and minerals.

733. Philip John Passavant, of Bradford, York, machine-comber, and John Cure, of the same place, manager. Improvements in machinery or apparatus for combing wool and other fibrous substances.

734. William Simpson, of Birmingham, Warwick, agricultural-implement maker. Improvements in apparatus for communicating alarm-signals on railways.

735. Henry Young Darracott Scott, of Queen's-terrace, Woolwich, Kent, captain in the Royal Engineers. An improved cement, applicable as a mortar, or for moulding purposes.

736. Edward Cooper Willis, of Cambridge, surgeon. An improved mode of manufacturing gutta percha into sheets.

737. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improved construction of hone. A communication.

Dated April 1, 1854.

744. Duncan Forbes, of Edinburgh, Scotland, student of divinity. Improvements in facilitating a reference to books.

746. John Inshaw, of Birmingham, Warwick, engineer, and James Parker, of Birmingham, locomotive superintendent. An improvement or improvements in suppressing the smoke and increasing the draught of the furnaces of locomotive and other steam engine boilers.

750. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Certain improvements in sewing-machinery. A communication.

752. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in printing fabrics, and in the machinery or apparatus employed therein. A communication.

754. George Brockelbank, of Point Blackheath, Kent. Improvements in obtaining metals from ores.

756. George Fergusson Wilson, of Belmont, Vauxhall, managing director of Price's Patent Candle Company, and William Walls, of Glasgow. An improvement in dyeing Turkey red.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

828. Henry Kemp, of Creekmoor, Poole, Dorset, gentleman. Certain improvements in the preparation of wood for planking and sheathing ships and other vessels, also in house, ship, and pier building, railway sleepers, &c., and all other purposes whatsoever, where wood is required. April 8.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," April* 14*th*, 1854.)

2634. Henry Willis. Improvements in the construction of organs and free-reed instruments.

(*From the "London Gazette," April* 18*th*, 1854.)

2661. George Carter. Improvements in the construction of steam-engine boiler and other furnaces.

2753. Joseph Wormald and George Pollard. An improved pipe wrench.

2775. Patrick Kelly. An improved apparatus for cultivating, preparing, and treating land, and for sowing seeds.

2793. Thomas Garnett and Daniel Adamson. Improvements in generating steam and in consuming smoke.

2799. John Henry Johnson. Certain applications of vulcanised India rubber. A communication from Charles Eugene Francois Guibal, of Paris, France, manufacturer.

2828. Edward Oldfield. Improvements in machinery for spinning and doubling.

2865. Richard Eccles, John Mason, and Leonard Kaberry. Improvements in slubbing and roving frames for cotton and other fibrous substances.

2879. Hippolyte Laurent du Bost. Improvements in the construction of locks and keys.

2883. Nicholas Victor Guibert. Improvements in forge hammers.

2888. William Redgrave. An improved safety travelling cap.

2912. Jean Baptiste Pascal. Certain improvements in obtaining motive power.

9. Joseph Madeley. An improvement or improvements in the manufacture of certain kinds of tubes, and in nuts for, and heads of screws.

30. Henry Hind Edwards. Certain improvements in treating peat and vegetable matters for the purpose of fuel, as well as in the extraction of other useful products therefrom. Partly a communication.

72. Felix Tussaud. An universal pump-press, with continuous action, called "Continuous Producer."

83. Auguste Edouard Loradoux Bellford. An improvement in the manufacture of glass. A communication.

123. Robert Galloway. An improvement in admitting air to furnaces where tubular boilers are employed.

167. John Westlake. Pulverising, washing, separating, amalgamating, and otherwise treating ores, gossans, earths, and rocks, so as the better to obtain and extract therefrom the gold and other metals and minerals which may be contained therein.

477. Leontide Aglaée Pallegoix and Alexandre Louis Bellange. Improvements in treating wheat and other grain.

553. William Isaac Cookson. An improvement in the reduction of lead ores.

579. Francis Whitehead and William Whitehead. Improvements in raising, forcing, and supplying water and other liquids.

625. Thomas William Keates. Improvements in the means of distilling turpentine and other resinous matters, and in manufacturing boiled or drying oils.

631. Frederick William Emerson. Improvements in machinery for pulverising, washing, and amalgamating quartz, and matters containing gold and silver.

649. Perceval Moses Parsons. Certain improvements in the construction of the permanent way of railways.

663. James Young. Improvements in brewing.

674. George Sterry. Improvements in the manufacture of mouldings, suitable for cornices, picture frames, architectural decorations, and other like purposes.

679. William Dinsley Skelton. An improvement in preparing flax for spinning.

692. Richard Doidge and John Cloves. An improvement or improvements in the manufacture of rolls to be used in shaping and impressing sweetmeats and plastic materials generally.

694. Samuel Humphreys. Improved apparatus for the heating or distilling of fatty, oily, and resinous matters. A communication.

709. James Alexander Manning. Improvements in the treatment of sewerage.

715. John Roberts. Improvements in the construction of cabriolets.

729. Elmer Townsend. An improvement in machinery for sewing cloth or other material. A communication from Alfred Swingle, of Massachusetts.

746. John Inshaw and James Parker. An improvement or improvements in suppressing the smoke and increasing the draught of the furnaces of locomotive and other steam-engine boilers.

752. John Henry Johnson. Improvements in printing fabrics, and in the machinery or apparatus employed therein. A communication.

756. George Fergusson Wilson. An improvement in dyeing turkey red.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed April 13, 1854.

2357. Sir John Scott Lillie.
2368. Mary Ann Davy and Ann Taylor.
2369. William Palmer.
2378. John Henry Johnson.
2379. Buckley Royle and William Mac Ewan Chell.
2384. Alexander Mac Dougall.
2390. John Macmillan Dunlop.
2419. William Binns.
2428. Jonathan Woofenden.
2528. James Chesterman.
2563. William Racster.
2867. Frederick Osbourn.
2900. Benjamin Fullwood.

1854.
70. Marcel Vetillart.
197. Sydney Smith.
206. William Palmer.
253. Albert Robinson.
264. James Stevens.
288. Thomas and William Hemsley.
296. Edward Poitiers.
301. Abraham Pope.
327. Jacques Rives.
347. James Cox.
350. John Greenwood.
390. William Morrison.

Sealed April 18, 1854.

2399. George Louis Stocks.
2401. Alphonse Doste Noel.
2403. Cornelius Nicholson.
2558. James Scott.

1854.
55. The Rev. William Renwick Bowditch.

Sealed April 19, 1854.

2410. William Roy, senior.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

P. S. — The difference of the velocities with which light and sound travel may be very readily discovered by experiment. If a series of observers be placed in a line at equal distances asunder, and the first of them discharges a pistol, the others of the series may severally note the intervals that occur between the flash and the report. Upon comparison, these intervals will be found to differ in a regular order.

A Subscriber.—Final specifications may be seen after six months from the date of the patent have expired (not before, though they may be filed earlier), at the office of the Commissioners of Patents, Quality-court, Chancery-lane, between the hours of 10 and 4. We cannot answer your second question, as it depends considerably upon the terms of your registration.

T. Laidler.—We forwarded you the pamphlet your letter refers to, but have received no acknowledgment of the receipt of it.

W. L., T. T. W., and *Clericus.*—Your communications will probably be inserted in our next.

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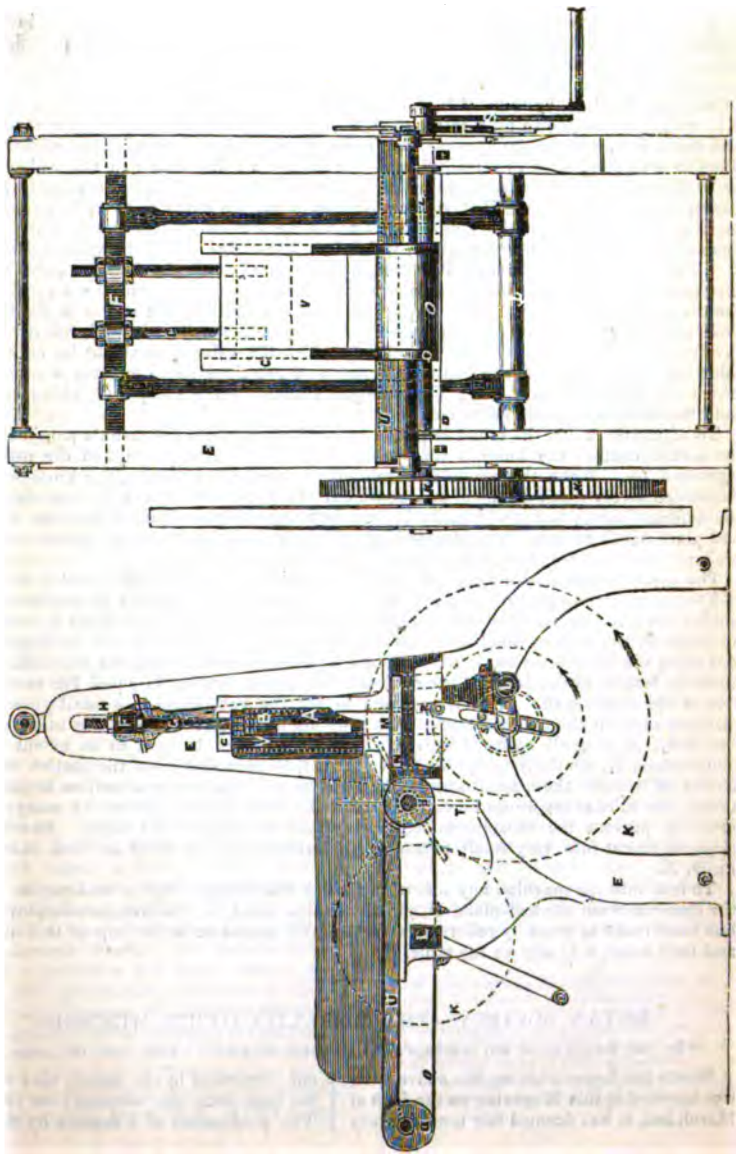
CURTIS AND DONKIN'S PATENT MACHINERY FOR CUTTING SUBSTANCES USED IN THE MANUFACTURE OF PAPER.

Fig. 2.

Fig. 1.



CURTIS AND DONKIN'S PATENT MACHINERY FOR CUTTING SUBSTANCES USED IN THE MANUFACTURE OF PAPER.

(Patent dated October 25, 1853.)

MESSRS. CURTIS and Donkin have patented a very useful machine for cutting rags, ropes, and other substances used in the manufacture of paper. The engravings on the preceding pages represent their machine, fig. 1 being a sectional elevation, and fig. 2 an end view of it.

A is a knife fixed to a cast-iron block, B, which slides in two grooves made in the two standards, C C, which are fixed to the bed-plate, D, of the machine. This bed-plate is supported by two side-frames, E E, which are carried up to form two guides for the cross-head, F, to slide in; to the latter the knife-block, B, is attached by two rods, G G, secured to the cross-head, F, by nuts, H H H. To the cross-head, F, are attached two side-rods, I I, worked up and down by a crank-shaft, J, which is turned by means of the spur-wheels and shaft, K L. Immediately under the knife, A, is a plate of metal (iron preferred), M, fixed on a piece of wood or metal, N, which is let into a recess made in the bed-plate, D; on to this plate, M, the substances to be cut are fed by means of an endless band, O, which passes over the two rollers, P Q, and is advanced a certain distance at each stroke of the machine by a pin, R, on the tappet, S, (fastened on the end of the crank-shaft) coming against the arms, T T, of a star-wheel, which is keyed on the end of the spindle of the roll, P. The amount which the roll, P, is turned, and consequently the distance which the endless band, O, is moved forward, depends upon the number of arms in the star-wheel, and the distance the pin, R, is fixed from the centre of the crank-shaft; and it is for this purpose made adjustable on the tappet, S; the distance the endless band is moved at each revolution of the machine is the length into which the substances would be cut; U is a table to support the endless band, O, made with two sides so as to form a trough, into which the substances are laid; V is a weight sliding on the rods, G G, which serves to hold the substances while being cut.

To adjust the knife, the crank is put within an inch or so (in the crank's path) of turning the bottom centre; the knife is then made to touch the iron plates, and the nuts, H H, tightened up. When the crank is absolutely on the bottom centre, the knife will have descended a very small distance, and would cut the plate were it not for the elasticity of the different parts; but it will easily be seen that any substance placed between the knife and plate would be cut. The descending on to iron or other metal appear to have a tendency to blunt the knife, but in practice this offers no difficulty.

The action of the machine can easily be traced in the above description, and is as follows:—The substances to be cut are placed on the endless band, O, which moves forward and pushes the foremost portions between the knife, A, and plate, M; the knife then descends and cuts off the portion which is on the side of the knife opposite to the feeding-band, O, and when the knife ascends, another portion is pushed forward and cut off, similar to the above in length, as the distance the endless band moves forward is equal for each revolution of the crank-shaft. If it is required to cut the substances into small pieces, as for instance rags for the manufacture of paper, we fix at a right angle or any other angle to the knife, A, a small knife or knives, which are adjusted by nuts so as to cut into the metal-plate, M, similarly to the knife, A. It will be seen that when the portion of rags to be cut off is under these small knives, they will be cut lengthways as well as across, that is to say, the substances would be cut into square or other shaped pieces. A wedge-piece is fitted to prevent the substances being cut from sticking to the knife. Should it be required to cut into very small pieces, small knives could be fixed on both sides of the knife, A.

To feed into the machine any sort of substance which would have a tendency to get into the space between the bed-plate, D, and the endless band, O, the inventors employ an endless band made to press by rollers or other suitable means on to the top of the substance and thus cause it to slip on the table.

ROYAL SOCIETY.—THE MORALITY OF ITS MEMBERS.

(By the Reviewer of Mr. Babbage's "Exposition of 1851." Ante, vol. lvi., page 80.)

WHEN the Report, having the above title, was inserted in this Magazine on the 11th of March last, it was deemed fair towards every one interested in the matter that we should not then make any comment on the article. The publication of a defence by the person

principally concerned had been long promised. Even now, it would be desirable to have the proffered defence, and the report, side by side, in order to come to a just conclusion as to the exact position of all parties. But no defence has hitherto appeared, at least none has come to our knowledge. An article in this magazine, elicited Sir James South's information, which formed the ground of the discussion at the last anniversary meeting of the Royal Society, contained in the report above referred to. The article was published a long time ago. Probably, a large number of the readers of this magazine have not read the review adverted to, and therefore are unable to form a judgment as to whether the opinion broached by the reviewer was just or unfounded. Moreover, it may naturally be expected that the reviewer will have some observations to offer upon the whole case. He is obviously bound to make an ample apology to the reverend accused, if he cannot justify the stricture which called out Sir James South. For these, and some other reasons, the reviewer considers it only just to the character of this Journal, and a mere vindication of his own integrity, as well as a duty that he owes to the celebrated men who have been induced by his criticism to take the matter up; in the first place, to cite the parts from Mr. Babbage's work on the Exhibition of 1851, upon which the stricture was founded, so that the present readers of this Magazine may form their own conclusions; and then on behalf of British science, and in justice to all parties, to make such remarks upon the whole proceedings and the personages connected with them, as, in his opinion, are appropriate and requisite.

In the review of Mr. Babbage's work, having made some observations on the treatment which the author had experienced, we quoted the following passage from the chapter "On the Intrigues of Science," to explain the mystery which apparently overshadows that treatment:

"By some strange combination of circumstances, a quarrel in which I had no part, and with whose origin I am unacquainted, seems to have had an unanticipated effect in impeding the construction of the calculating engines.

"At the time of the foundation of the Astronomical Society, Sir James South, whose observatory and whose house were hospitably open to every cultivator of Astronomy, was on terms of intimate friendship with almost all of those persons at that period most eminent in science. It is sufficient to mention the names of Wollaston and Davy, and to add that when the late Mr. Fallows was appointed Astronomer at the Cape, although previously a stranger, he became for several months the guest of Sir James South, who assisted him in acquiring that practical knowledge of instruments so necessary in his new avocation.*

"In 1829 Sir James South was elected President of the Astronomical Society. It now appears, however, that previously to this appointment, *a party had been formed* adverse to Sir J. South, which party, with the view of thwarting him, placed in the office of Secretary the Rev. Richard Sheepshanks, Fellow of Trinity College, Cambridge.†

"In March, 1831, the Board of Visitors of the Royal Observatory of Greenwich met at the Admiralty to consider the propriety of separating the duties of Superintendent of the Nautical Almanack from those of Astronomer Royal. The new arrangement was advocated, amongst others, by Sir J. South, and after some discussion, in which Capt. Beaufort and myself took part, it was ultimately carried. As we were leaving the meeting-room, Mr. Sheepshanks, addressing me, said: 'I am determined to put down Sir James South, and if you and other respectable men will give him your support, I will put you down.' He at the same time told me he 'intended to put Captain Beaufort down.'

"During the course of 1832, it was found that the large equatorial mounting which had been contrived and executed by Troughton for his friend Sir J. South's 12-inch object-glass, was an entire failure. This produced at the time a difference between two friends who esteemed each other highly, and who had been for years united by reciprocal acts of kindness in ties of '*very intimate*' friendship. Well acquainted myself with the character of the parties, and the circumstances of the case, I have not the slightest doubt that this unfortunate affair might easily, by the exertions of judicious friends, have terminated in the entire restoration of their former friendship. But this was a course which the Rev. R. Sheepshanks took effectual means to prevent. Having himself a '*personal*' quarrel with Sir James South, he '*offered*' his services to assist Messrs. Troughton and Simms. He '*offered to go*' himself to examine the instrument in Sir J. South's observatory, and '*got his friend, Professor Airy, to go with him*' for the

* Sir James South, in conjunction with Sir John Herschel, completed the examination of 380 double and triple stars; a work for which the authors were awarded the great Astronomical prize of the Institute of France in 1825, and the medal of the Astronomical Society of London in 1826.

† "When he (Sir J. S.) was elected President, I (Rev. R. S.) was elected Secretary to keep him in order."

purpose of remedying the defects of the Equatorial.

"Notwithstanding he was told by Mr. Simms that '*Sir J. South had declared that no person could have been pitched upon more obnoxious than yourself*,' he still persevered in obtruding himself into Sir J. South's observatory, as the agent of Troughton and Simms, until it was at last discovered that no after contrivances or expense could correct the errors of an instrument itself radically defective in principle.

"It may readily be supposed that the continuance for months of these visits by Mr. Sheepshanks and Professor Airy, and the *irritating correspondence* consequent upon them, which, though *nominally* that of Troughton and Simms, was really '*directed by*' the Rev. R. Sheepshanks, destroyed all hope of a reconciliation. The parties then had recourse to the Court of King's Bench, and it was curious to observe the vigour and energy with which the Rev. R. Sheepshanks applied himself to the exercise of his earlier studies.*

"Having *volunteered* his services to Messrs. Troughton and Simms—he '*wrote every letter*' for them during the subsequent lawsuit—he acted for them in all the various characters of '*friend*' and '*adviser*'—of '*workman*' and '*agent*'—of '*attorney*' and '*counsel*;'†—he made an '*affidavit*' in the case—became a *witness* himself—and undertook to *intimidate witnesses* on the opposite side.

"This latter performance is fortunately rare in England, and is so remarkable that it is necessary to give some account of the proceedings.

"Not wishing to become involved in so disagreeable a case, I had refused to be a witness on the part of Sir J. South. Having, however, had some conversation on the subject with the late Lord Abinger (then Mr. Scarlett), he represented to me that my evidence was essential for the justice of the case, and upon that ground I reluctantly waived my objection to appear as a witness.

"Having been examined in chief on the seventeenth day of the Arbitration, I remained in the room a few minutes after the arbitrator had left it. The Rev. R. Sheepshanks, the only other person then present, addressing me, said, 'it was necessary to *discredit me*, because I had supported Sir J. South.' He added, that 'he would, at a future time, *attack me* publicly on *another subject*, on account of the part I had taken in this matter.'

"The remembrance of his former threats, more than four years before, at the Visitation at the Admiralty, added to the knowledge of the unremitting perseverance with which he carried on his hostility to Sir J. South, satisfied me that it would be unsafe for the cause of truth, and possibly injurious to myself, if I were not to take measures for making known the nature of the weapons which the Rev. R. Sheepshanks was employing. As he had ventured, *after* my having given evidence on oath, to threaten me with injury, with the hope of inducing me to modify that evidence on cross-examination, it appeared to me probable that he might have been tampering with the evidence of other witnesses in the same cause, who from their position or circumstances in life, might be compelled by the fear of his vengeance to shape their evidence so as to adapt it to his views."

Referring to the latter part of the above quotation, we said "the preceding narrative discloses as gross an outrage as was ever perpetrated upon honest independence followed up by a persecution as vindictive and abominable as it is un-English and unprecedented. The author states that *after* he had given his evidence he was *threatened with injury*, with the hope of inducing him to modify that evidence upon cross-examination. If this be not subornation of perjury it is very like it."

It was this opinion, set forth in the review, that called Sir James South into the field. Was the writer justified in coming to that conclusion or not—is now the question. To answer it satisfactorily, it may be desirable to state what "Subornation of perjury" means:—"Subornation of perjury is the offence of procuring another to take such a false oath as constitutes perjury in the principal." (Deacon, on Criminal Law—"Perjury.") Was, then, the Rev. R. Sheepshanks' *threat with injury* used with the hope of inducing Mr. Babbage to modify the evidence that he had already given on oath, in cross-examination, subornation of perjury? No, *it was only very like it*. Russell, on Crimes and Punishments, thus explains the point: "Subornation of perjury by the common law is an offence in procuring a man to take a false oath amounting to perjury, who actually takes such an oath. But it seems clear that if the person incited to take such an oath, do not actually take it, the person by whom he was so incited is not guilty of subornation of perjury; yet it is certain that he is liable to be punished, not only by fine but also by infamous corporal punishment."

The reverend gentleman is an expert casuist, and will very likely split hairs upon the distinction between false oath and

* At an earlier period of his life, his studies were directed towards the profession of the law.

† On the 19th of July, 1836, at the 23rd meeting under the arbitrator, the Rev. R. Sheepshanks *cross-examined* Mr. Savage, the architect.

perjury. He is at full liberty to exercise his pious vocation; still it is thought that his threats with injury, uttered with the hope of inducing Mr. Babbage to modify evidence given on oath, is very like subornation of perjury, and exactly like an attempt to commit that offence, the consequence of which has been quoted at length. The allegations above cited from Mr. Babbage's work have never, it is believed, been called in question: our opinion, quoted by Sir James South, is therefore, it is thought, completely supported and justified by the facts of the case, and it is left with undoubting confidence to the judgment of the readers of this Magazine.

But although the opinion given in the review be well founded, why, it may possibly be asked, was it made the subject of remark —why was such prominence given to it by Sir James South? The preceding extract from Mr. Babbage's work sets forth, that the threat of injury to Mr. Babbage was used in the hope of inducing him to modify the evidence which he had sworn, so that it should be adverse to Sir James South's case then pending. If upon reading an account of that unprincipled and malicious attempt to pervert testimony, thus brought before the public, Sir James had not adduced the facts alleged in his letter, he would not have done justice to himself nor to his persecutor. Lest, however, the above extract should be insufficient to support this view, we will give another quotation from Mr. Babbage's book that immediately follows the one already given:

"The Rev. R. Sheepshanks discovered on reflection no impropriety in this course of intimidating witnesses, or of attacking those who could not be induced to take up his own private quarrels. He thus defended both:

"'*I think it allowable to throw down the gauntlet in this manner.*'

"'*I have another ground of dispute with Captain Beaufort, and certainly intend to put him down.*'

"The gallant Admiral has survived many a dangerous day, and needs not the pen of a friend to protect his honest and well-earned fame.

"The reader may perhaps be astonished at the statement made in the preceding pages, and feel disposed to consider it an *ex parte* statement. It *is entirely* an *ex parte* statement: it is not necessary for its support that the reader should give credence even to that small part of it which appears to rest on my own evidence before the arbitrator. *The whole of it is founded entirely on the testimony of the* Rev. R. Sheepshanks *himself*. Every statement of those which are marked as quotations was either elicited from him on his cross-examination, or in the few instances in which it came from myself, its correctness was confirmed by his subsequent admission or re-statement. After my statement, and the Rev. R. Sheepshanks' reply to it, the arbitrator, addressing him, said:

"'With respect to the matter of fact, you agree?'

"Rev. R. Sheepshanks: 'Yes, we agree as to the matter of fact.'

Professor Airy, who was afterwards appointed Astronomer Royal, had long before become as deeply engaged as his friend, Mr. Sheepshanks, in this most unfortunate quarrel. Years of aggravating delay and discussion resulted from the procrastinated reference, and at length one of the parties, Mr. Troughton, being dead, a decision not satisfactory to either was given in December, 1838. But the inextinguishable desire 'to put down Sir James South,' survived the lawsuit, which was only used as a means, and reappeared from time to time through the aid of the press, in forcible but somewhat unmeasured charges and recriminations between the Astronomer Royal, the Rev. R. Sheepshanks and others on the one side, and the astronomer of Campden-hill, on the other.

"It was a curious though a very painful study, to observe from time to time the various consequences of this feud.

"Against those men of science who refused to forsake their ancient social relations with Sir James South, a system of disparagement was maintained, which could not fail in the course of time to produce its effects. The avowed object of the party of which the Rev. R. Sheepshanks was the organ, was, in his own expressive words, to *discredit and put down every respectable person* who supported Sir J. South.

"It was melancholy to observe the gradual change in the expression of opinions by some of those qualified from their knowledge to guide the opinion of the public. Intimidated at first into silence; the uncontradicted assertions of those around them then got possession of their minds, until at length, without any new examination, they were flattered into an acquiescence in, if not indeed into the expression of, opinions entirely opposite to their former ones. These new views were doubtless conveyed by their flatterers to other ears, and thus the process of '*discrediting every respectable person*' opposed to them, was carried on under the authority of honourable names.

"One after another almost all Sir James South's old friends and acquaintance amongst *men of science only, however*, were alienated from him.

"One man was alarmed by the fear that

some inaccuracies in his astronomical publications should be severely criticised. Of another it was hinted that his mathematics were all wrong, and might be shown up.

"Those who were timid feared the anger of the dominant party; those who were young might have their prospects blighted by even appearing in friendly relations with him who supported the unequal conflict; those who were old loved repose, and found it easiest to appear to side with the most numerous party; whilst those who saw through the whole of it, had better things wherewith to occupy their minds, than to attend to such affairs.

"It is obvious to all who have observed society that such a system of '*discrediting*' carried on for a series of years, especially against one too much occupied or too proud to expose it, must end in establishing the set of opinions propagated by the party. Honest and even tolerably well-informed persons will at length be misled, and be found to adopt them."

These extracts placed before the English people the startling fact that a system of *discrediting* had been furtively carried on for a series of years: that one after another almost all Sir James South's old friends and acquaintances, *amongst men of science only, however*, were alienated from him. Mr. Babbage's work vouched for the substantial truth of his narrative, that Sir James South's reverend persecutor had followed his vocation of discrediting him with unflinching perseverance, and that some success attended his unscrupulous expedients; the sketch clearly showed that the rev. gentleman's malignancy towards Sir James was implacable, and that his sanctimonious labours to *put him down* were as incessant as they were abominable. Graphic, however, as the sketch was, it showed only a part of the peculiar features that belong to the devout persecutor. Sir James very appropriately, and with becoming candour and honesty, added some other characteristic lineaments, and nearly completed the picture which affords the somewhat novel information that the order of the priesthood enabled its member to become an expert forger, to put down men of eminence, to practise shabby frauds upon the customs, and to discredit men that he could not induce to perjure themselves.

Perhaps some readers may still say, though you have given a sufficient reason why Sir James South added the information contained in his letter with respect to subornation of perjury in support of the opinion that he cited,—yet why did Mr. Babbage bring the subject before the Royal Society at their Anniversary Meeting? We have already quoted at some length from the chapter on the "Intrigues of Science" in Mr. Babbages' work. The whole chapter is highly deserving every one's attention who takes any interest in British science, or in the treatment of its most distinguished cultivators. If the quotations already given from it do not suggest a satisfactory answer to the above question, as we think they should, the reader who still doubts should give the whole chapter a perusal, or turn to our review in this Magazine. However, there may be readers who are unable to do the one or the other. To assist them we give another short extract from the same chapter:

"During many years I have frequently found, in my communications with members of Government on subjects connected with the calculating engines, difficulties on their part which remained entirely unexplained;—unseen obstacles which were never alluded to, but whose existence could not be doubted.

"Although frequently warned by personal friends that it was unwise to neglect such machinations as those which I have, at length, been reluctantly compelled to expose: yet I was unwilling for a long time to believe that they were directed against myself.

"I have now traced the connection of the Rev. R. Sheepshanks (who had avowed his determination '*to discredit me*,' and also to '*attack me on another subject at a future time*,') through his friend, the Astronomer Royal, with the Government."

Having, then, at last convinced himself by whose machinations the unseen obstacles during so many years had been thrown in his way,—having traced his unaccountable treatment up to the reverend personage who had avowed his determination to *discredit*, and also *to attack him* on *another subject* at a *future time*, because he would not modify his evidence given upon oath,—that is, perjure himself; remembering all this, and seeing the startling information contained in Sir James South's letter, was it not perfectly consistent with Mr. Babbage's duty to the public to bring the matter formally before the Royal Society,—of which both the accused and accuser are members,—at the Anniversary Meeting when the officers of the Society are chosen, and consequently a large number of members generally attend? The facts alleged on personal knowledge by Sir James South, a distinguished member of the Society, were published in this Magazine. He vouched for their truth by attaching his name to the narration. The character and honour of the Society were to some extent involved in the accusation; it was therefore clearly the duty of Mr. Babbage to give the reverend accused an opportunity of clearing, if he could, the

Society from the disgrace which he was publicly charged with having brought upon it. On the other hand, it gave the Society an occasion to make known its views as a Royal and public corporation, ***standing at the head of English scientific institutions,***— when one of its members is openly charged by another member with having committed the serious and disgraceful offences of forgery, perjury, and public fraud. We are decidedly of opinion that every member of the society who had any knowledge of the charges made in these pages ought to have lent their assistance to Mr. Babbage in bringing the matter before the Society, and that he deserves their thanks for giving the Society and its accused member an opportunity of exculpating themselves.

(*To be continued.*)

ON THE GROWTH OF PLANTS IN CLOSELY-GLAZED CASES.

At a recent meeting of the Royal Institution, Stephen H. Ward, M.D., London, delivered a highly interesting lecture on the above subject. Having glanced at the various causes, the soot, dust, deleterious gases, and cold, drying winds, which interfere with the growth of plants in cities and towns, the lecturer noticed the incident which, in the year 1829, led Mr. Ward to discover a remedy in the "closely-glazed cases."

In the principle and construction of the Wardian cases there is no mystery whatever. The principle is the exclusion from the plants of deleterious influences and agents, the admission and retention of those that are necessary; and it is realized in a common stoppered bottle, a garden-pot, or a pan covered with a bell-glass, or a trough surmounted by a glazed framework. Nothing can be more erroneous than the notion which has been entertained, even by educated persons, that these cases are hermetically sealed, and that the plants live without air. Closely-glazed the cases are and should be, but not closed. Closed only to adverse, open to genial and indispensable influences. Excluding soot and dust and the deleterious gases entangled in smoke, guarding against sudden changes of temperature and drying winds, preserving the nutritious aqueous vapour, admitting light, and subtily, but certainly in obedience to the diffusion law, such renewal of air as is required by the plants.

The construction of a case is very simple and is easily effected. The trough may be made of any material, wood tarred within, earthenware, or zinc; the last being perhaps preferable. To this a bell-glass or glazed framework is to be nicely adapted; and, supposing that ferns are to be grown in the case, the mode of arrangement is as follows. Into the bottom of the trough are thrown pieces of stone, potsherds, &c.; upon this a mixture of peat-mould and loam up to the level of the trough, and on the surface any artificial elevation or picturesque rock-work. The ferns are then planted, the mould is well saturated with water, the glass covering is fitted on, and the case placed in a situation where it may be exposed to a due amount of light, but for ferns, not to the full force of the sun's rays. For the drainage of superfluous water, it is necessary either to have apertures perforated in the bottom of the case, or, what is better, a depression in a corner from which such water may be removed by means of a sponge or syringe. In a case so arranged, the several natural conditions of plants are fully realized. The closely-fitting glass covering, while it excludes soot and dust, admits freely the light which is essential to the vigorous and healthful growth of plants, since without it they are not only duly nourished, and grow devoid of odour and colour, sickly and unattractive in aspect. In the next place, the water with which the mould has been saturated, and without which neither seeds nor plants can develop or grow, is retained, or escapes only in inappreciable quantities. Exhaling from the leaves and rising from the mould in the form of vapour, it becomes condensed on the surface of the glass in the form of small beaded drops, which, coalescing, form streamlets that course down the side of the glass: the water is again absorbed by the mould, evaporated and condensed, and so keeps up a ceaseless circulation. The plants, in a bottle which was exhibited, had had no fresh water for nineteen years. Again, the perfect tranquillity of the air within the case enables the plants to bear both higher and lower degrees of temperature than they would do if exposed, because the protective vapour which surrounds them is not carried off. For this reason, a glass shade placed over cut flowers preserves them in a state of freshness for a considerable period. And, lastly, with regard to the admission of air. The case is not, and cannot be hermetically sealed or air-tight. If it were, the first change in the relative temperature of the air within and without would result in the fracture of the glass. Change of air is effected very subtily, but must ever be going on in obedience to the diffusion law by which gases of different density become intimately blended; rising against the attraction of gravitation, passing through bladder and other membranes, and through barriers more complete than a glazed framework

which is only nicely adapted to, not amalgamated with the case below.

While the different natural conditions are realized in one of these cases, they may be so modified as to suit the requirements of different kinds of plants. Ferns generally require a peaty mould, a humid atmosphere, and a moderate supply of light. As an instance of the perfection to which they will attain under this plan, may be noticed the success which has attended one of the most delicate, the Trichomanes speciosum. In the first experiment made with this, the fronds attained a size one-fourth larger than native specimens either from Killarney or Teneriffe; and Mr. Callwell, of Dublin, has a plant which, remarkably slow as this fern is of growth, has produced in nine years three hundred fronds varying in length from 14 to 20 inches and a half. For flowering plants a more loamy soil is desirable, less moisture, a greater volume of air, and more or less exposure to the direct rays of the sun. But that flowers can be grown just as successfully as ferns is proved by the fact, that in the most smoke-charged atmosphere in the east of London, various spring flowers, fairy roses, &c., flowered, year after year, most luxuriantly, and remained in flower much longer than they do in our country gardens. For cactuses and succulent plants a dry sandy soil and direct sunlight are necessary. In short, the isolating glass covering enables us to obtain in these cases a climate within a climate, a little world within a world.

As regards design and dimensions, the cases may be varied to an indefinite extent. It is desirable, in order to obtain a light and elegant appearance, that the trough should be shallow; increase of surface for the growth of plants being gained by some picturesque and central elevation. For hints, however, in reference to this part of the subject Mr. Ward's little work* may be advantageously consulted.

The applications of these cases are various. The first, and one of the most important, is to the growth of plants in towns and cities; the citizen being enabled by them to enjoy the constant prospect of ferns and flowers, instead of looking out upon dingy tenements. They may not only be used as beautiful window-blinds; but a case of larger dimensions may be built out from a library or breakfast parlour, in which, by aid of moderate artificial heat during the winter, plants of warmer climates may be associated with those of this country. Not only may they be made to occupy window-recesses, but the spaces between and at the sides of windows, which under the present system of domestic architecture are usually so dark as to be unavailable for pictures or any other purpose, might be converted into Wardian cases, in which plants and animals might be associated. Such an arrangement would be the source of constant interest to the mind, and would, at the same time, render the room lighter, and consequently healthier and more cheerful. Modifications of the plan, such as have just been suggested, are, however, adapted only for those of tolerably ample means. Now, the cultivation of plants has ever been peculiarly the poor man's luxury. To the taste and love for nature which he often exhibits, these cases may be made to minister; for they may be constructed at a very trifling expense, and the plants that would flourish in them,—the primrose and anemone in spring, the wood-sorrel, the pimpernel, the common ivy, which may be trailed over any part of the case, and the commoner kinds of fern may be procured by any one in a long walk or a very short railway ride out of London.

The lecturer, in the next place, alluded to the application of the "cases" in promoting what he termed the "æsthetics" of the sick-room; and showed how important it was, in the treatment of chronic diseases, and during the period of convalescence from others, to endeavour to dissipate morbid feelings, and divert attention from still lingering symptoms by the cheering presence of things of beauty. In the chamber of the invalid, these cases presented an advantage over plants exposed in the ordinary way, because they confined those exhalations from flowers, which, agreeable as they may be to sense, are frequently prejudicial to the patient. At the suggestion of Mr. Burch, the resident medical officer of the London Hospital, some money had been collected for the construction of cases to be placed in the wards of that hospital.

In the conveyance of useful plants from one country to another, the plan has also been of signal benefit to mankind.

Having glanced at the various philosophical purposes to which these cases may be applied, such as observations upon the habits of plants in an undisturbed atmosphere, the value of different moulds, and the action of the several vital stimuli, and having exhibited a plant of Linaria Cymballaria in illustration of the effects produced by deficient light, the lecturer proceeded to notice the application to animals and man.

Philosophers have long been aware of the influence exerted by plants in counterbalancing the effects of animal respiration. Towards the end of the

* "On the Growth of Plants in closely-glazed Cases." By N. B. Ward, F.R.S. Published by Van Voorst. Second Edition.

last century, Lavoisier led the way in determining what has been happily called "Nature's balance," by showing the exact changes produced in the atmosphere by the respiration of animals. Priestley, soon after, proved by experiments with growing plants in air that had been vitiated by respiration and combustion, that they restored air so vitiated to its original purity. Senebier demonstrated the precise action exerted by plants in decomposing carbonic acid and fixing the oxygen, and that this takes place in water as well as air. Boussingault further proved that plants decompose water, and, from this, furnish another source of oxygen to air that has been deteriorated by animal life. Now, these counterbalancing actions of animal and vegetable life which are ever going on in the world without, and which are among the greatest marvels in the economy of Nature, may be realised most completely in one of these cases. Mr. Ward felt this, and accordingly, in 1841, established in his largest fern-house, in a capacious earthenware vessel given to him by Mr. Alfred White, an aquarium for fish and plants. In this vessel, which contained twenty gallons of water, and which he surrounded with rock-work raised several feet above its margin, he placed gold and silver fish in company with several aquatic plants, namely, Valisneria spiralis, Pontederia crassipes, Pistia stratiotes, and Papyrus elegans. In this miniature lake, the water of which was never changed, but kept in a constantly pure state by the action of the associated plants, the animals lived in a healthy condition for many years. This aquarium or vivarium soon gave the hint to Mr. Bowerbank, who procured a large glass jar, in which he placed stickle-backs, minnows, and snails, with plants of Valisneria, and covered in the jar with a piece of glass. Mr. Mitchell, of the Zoological Society, states that the jar just noticed, gave him the suggestion for the interesting vivaria at the Gardens. Aquaria in open bottles would seem to have been ornaments of the philosopher's study nearly a hundred years ago, as a coloured illustration in a work by Ledermüller, published in 1763, will prove. All that Mr. Ward claims credit for, is the having introduced them into his closed cases, and depended for success entirely upon the counterbalancing actions of animal and vegetable life.

By considerably increasing the volume of air, and introducing plants of high purifying action, there can be little doubt that these cases may be applied to the higher animals and even to man. Medical men have long felt the want of buildings, in which they might imitate the climate of any country, and adapt it to the necessities of the patient. In the early part of the present century, one or two physicians paid particular attention to the maintenance of equable temperature in the rooms of consumptive patients, through the aid of German stoves, and what was then known of the principles of ventilation; and Dr. Arnott, in his "Elements of Physics," published more than twenty years back, describes a contrivance for the same purpose. From Mr. Ward, however, emanated the suggestion for the construction of a Sanatorium upon philosophical principles. His views were first brought before the public in the lecture delivered by Professor Faraday, in April, 1838, and are clearly laid down in the first edition of his work, "The Growth of Plants," &c., published in 1842. Those who are acquainted with the means by which M. Payerne and his crew contrived to remain for twenty-four hours in a submarine vessel under the Seine, will feel that, whatever may be the difficulties in the erection and renewal of air in such a building, they are not insurmountable. Sir J. Paxton's design for a Sanatorium in connection with the Hospital for Consumption at Victoria-park, would seem to realise the sort of edifice proposed by Mr. Ward.

MR. FAIRBAIRN'S EXPERIMENTS ON LOCOMOTIVE BOILERS.

In No. 1574, vol. lix., we published a lengthy paper of Mr. Fairbairn's, detailing the results of "Experimental Researches to determine the Strength of Locomotive Boilers, and the Causes which lead to Explosion." The paper is now published in a separate form,* and in a highly important Appendix, the author states that, in order to test with accuracy the tensile power of the different descriptions of stays used in locomotive boilers, and to effect a comparison between those screwed into the plates and those both screwed and riveted, it was deemed expedient to repeat Mr. Ramsbottom's experiments on a larger scale; and by extending the tests to copper stays as well as iron ones, it was considered that no doubt could exist as to the ultimate strength of those simply screwed, the tensile powers of the stays themselves, and the relative difference between those and the finished stays when screwed and riveted on both sides of the fire-box.

The large lever and requisite apparatus being at hand, the experiments proceeded as follows:

* "Experimental Researches, &c. By W. Fairbairn, F.R.S. London: Taylor and Francis, Red Lion-court, Fleet-street. 1854."

Experiments to determine the Ultimate Strength of Iron and Copper Stays, generally used in uniting the flat surfaces of Locomotive Boilers.

EXPERIMENT I.—Iron Stay, $\frac{3}{4}$ths of an inch in diameter, screwed into a copper plate $\frac{3}{8}$ths of an inch thick.

No. of experiment.	Weight in lbs.	Remarks.
Lever 1	9,860	With the last weight 18,260 lbs. = 8·1 tons, the threads in the copper plate were drawn out or stripped after sustaining the weight a few seconds.
2	11,540	
3	13,220	
4	14,900	
5	16,580	
6	18,260	

EXPERIMENT II.—Iron Stay, $\frac{3}{4}$ths of an inch in diameter, *screwed and riveted* into a copper plate $\frac{3}{8}$ths of an inch thick.

No. of experiment.	Weight in lbs.	Remarks.
Lever 1	9,860	When the last weight 24,140 lbs. = 10·7 tons, was laid on, the head of the rivet was torn off; and the stay, along with the threads in the copper, was drawn through the plate.
2	11,540	
3	13,220	
4	14,900	
5	16,580	
6	18,260	
7	19,940	
8	21,620	
9	23,300	
10	24,140	

EXPERIMENT III.—Iron Stay, $\frac{3}{4}$ths of an inch in diameter, *screwed and riveted into an iron plate* $\frac{3}{8}$ths of an inch thick.

No. of experiment.	Weight in lbs.	Remarks.
Lever 1	9,860	With the last weight, 28,760 lbs. = 12·5 tons, the stay was torn asunder thro' the middle, both screw and plate remaining perfect.
2	13,220	
3	16,580	
4	19,140	
5	20,780	
6	23,800	
7	25,980	
8	26,660	
9	27,940	
10	28,760	

EXPERIMENT IV.—Copper Stay, $\frac{3}{4}$ths of an inch in diameter, screwed and riveted into a copper plate $\frac{3}{8}$ths of an inch thick.

No. of experiment.	Weight in lbs.	Remarks.
Lever 1	9,860	With 11·540 lbs. the body of the stay was slightly elongated.
2	11,540	Elongation considerably increased with 14,900 lbs.
3	13,220	
4	14,900	Broke with 16,265 lbs. = 7·2 tons, after sustaining the load upwards of three minutes.
5	16,265	Ultimate elongation 0·56 inch in a length of 3 inches.

It will be observed, on comparing the results obtained from the above experiments, that iron plates and iron stays are considerably stronger than those made of copper. It may not be advisable to have the interior fire-box made of iron, on account of its inferior conducting powers and its probable durability; but so far as regards strength, it is infinitely superior to that of copper, as may be seen by the following

SUMMARY OF RESULTS.

No. of experiment.	Breaking weight in tons.	Resistance per square inch in tons.	Ratio, Experiment III., the iron stay and iron plate taken as 1000.
III.	12·5	27·7	1000 : 1000 Iron and iron.
I.	8·1	18·8	1000 : 648 Iron and copper screwed.
II.	10·7	23·6	1000 : 856 Iron and copper screwed and riveted.
IV.	7·2	16·1	1000 : 576 Copper and copper screwed and riveted.

On the above data, it will be found that the iron stay and copper plate (not riveted) have little more than one-half the strength of those where both are of iron; that iron stays screwed and riveted into iron plates are to iron stays screwed and riveted into copper plates as 1000 : 856; and that copper stays screwed and riveted into copper plates of the same dimensions, have only about one-half the strength of those where both the stays and plates are of iron. These are facts in connexion with the construction of locomotive, marine, and other description of boilers having flat surfaces, which may safely be relied upon, and that more particularly when exposed to severe strain, or the elastic force of high-pressure steam.

TALBOT'S ROCK-BORER.

As we have been applied to for a description of Talbot's Rock-Boring Machine, which the American correspondent of the *Times* represented as exciting considerable interest in the United States, we extract the following account of it from the American *Mining Magazine:*

"The machine is, in effect, a huge seventeen-feet auger, slowly turning at the rate of one revolution per hour, and advancing at the same time, from four to eight inches per hour, according to the solidity of the rock perforated. The common auger, as every one knows, is fitted with two fixed cutters, vertical to its centre, each cutting its way spirally into the wood. The cutters of this auger, four in number, are likewise fitted vertically to the centre, and cut their way spirally into the rock, with the combined revolution and advance of the machine. The only difference is in the construction of the cutters, which we shall presently attempt to explain.

"The principal parts of the machine are as follows:—A carriage of massive iron resting on ways, and pushed forward at the rate above named, by means of a screw, turned by a simple contrivance similar to that which propels the carriage of a saw-mill, which is readily graduated to produce any desired speed, from two to twelve inches per hour. Upon this carriage rests all the machinery, engine included, and its total weight of 150,000 lbs. affords a sufficiently steady basis of operations to prevent the slightest perceptible tremor. 2. A great face-plate like that of a lathe, circular and vertical, resting and revolving on a hollow shaft large enough to admit the play of a horizontal beam, piston-like, through its cavity. 3. Four sectors (as if a wheel were divided into quarters), with their apexes hinged upon the face of the plate in such positions, equidistant, as to bring their segments of circumference at right angles to each other, meeting at the centre of the plate. The horizontal beam above-mentioned connects by an arm with each of these segments, at their corners, which meet at the centre of the plate; and in playing back and forth, causes each to vibrate in a segment of a circle which passes through half the diameter of the tunnel, the four meeting at the centre. 4. The circumference of each sector is armed with three small wheels having teeth, not unlike circular saws, set obliquely, so as to strike the face of the rock in the same direction as a stone-cutter's chisel, and to act upon it in substantially the same manner, as they are rolled upon it back and forth by the vibratory swinging of the sectors. Each cutter in succession thus steadily carves away its proper thickness of rock, as it swings back and forth from the centre to the circumference of the tunnel, urged against the rock by the slow advance of the carriage, and borne around by the revolution of the face-plate. The thickness of the shaving carved away by each cutter, varies from one to two inches, according to the hardness of the rock.

"Four cutters, passing around once in an hour, and each cutting one and a half inches deep, make, of course, a progress of six inches per hour, which is the rate now made at Harlem. It is said that, after allowing for all necessary interruptions, the machine may be run steadily for twenty hours out of twenty-four; making a progress of ten feet per day. Sixty horse-power of steam, two engineers, and two men to shovel out the broken rock, comprehend the expense of working the machine at this rate; to which, the expense of keeping up the cutting-wheels, is the only additional item of importance which seems necessary to be added."

LOYSEL'S HYDROSTATIC PERCOLATOR.

In the library of the Institution of Civil Engineers, a very simple and ingenious apparatus was lately exhibited, designed by M. Loysel, for extracting colouring matters from dye-woods, and also for obtaining infusions or extracts of vegetable substances, for medicinal or other purposes.

The principle of action was that of direct hydrostatic pressure, applied by a simple and inexpensive apparatus.

The substance to be operated upon was placed within a cylinder, whose bottom was finely perforated; a similar pierced diaphragm was then placed over it, so as not

to produce any pressure. The liquid, either cold or hot, was poured into an upper reservoir, whence it descended, by a centre tube, to beneath the lower diaphragm, and was forced upwards by the pressure through the superposed substance, every particle of which it saturated in its passage, expelling the air and carrying before it all the finest portions to the upper strata, against the under side of the upper diaphragm. When a sufficient quantity of liquid had been passed, or the infusion was completed, a cock was opened, which permitted the infusion to return from above by its own specific gravity, through the substance already operated upon, thus completing the abstraction of any colouring or other matter not previously taken up, and at the same time filtering the liquid. By a second and similar process, anything still remaining in the substance could be extracted.

It was practicable, by varying the height of the column, to give any degree of pressure, and by the application of a lamp, or, in a large apparatus, of a coke fire, the temperature of the decoction might be maintained as might be desirable. By another modification, the steam generated in a small boiler regulated the action of the apparatus.

The system was described as being adapted to very numerous purposes, and the familiar application of it to making coffee was exhibited; the apparatus consisted of one vase, either of glass, china, or metal, whose cover, on being reversed, formed the reservoir and pressure column; and, in a very few minutes, clear, strong coffee was produced. It was stated that, in an apparatus adapted for a large establishment, four gallons of coffee had been made in twenty minutes. The apparatus appeared to possess the merits of great simplicity, of facility of management, and of being easily cleaned, and the infusion of the substance operated upon was perfect.

TEMPORARY RUDDERS.

To the Editor of the Mechanics' Magazine.

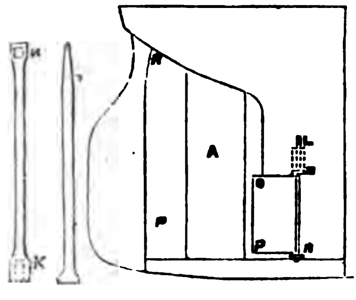
SIR,—The facility with which a ship is made to shape any course, by means of her rudder, is remarkable; on the other hand, the difficulty of changing the direction of a vessel's motion, whose rudder has been carried away, is equally striking. In the latter case, attempts have been made to steer the vessels by means of their *sails*; but these have been attended with but partial success, and we find upon one occasion, H.M.S. *Pique standing seaward several days, in a leaky condition*, all attempts to put her about being alike useless. Many such instances have occurred, in which the ships have been driven into shoal water and completely wrecked. In the case of the "Pique," above alluded to, she was eventually brought under control by means of a temporary rudder, which was at last shipped. These considerations render it of paramount importance that every possible precaution should be taken. First, to prevent the loss of the rudder; secondly, to find some substitute for it when it is disabled or carried away; especially as at the present time so many of our ships are being navigated in shallow waters. If this letter should only prove the means of eliciting from your readers suggestions concerning this great want of our royal and mercantile navies, it may lead to highly beneficial results. Men-of-war carry a spare "main-piece" of rudder, and a "shoe," which, with a spare topmast, or other large spar and some boards, can be readily converted into a rudder, and in fine weather shipped with comparative ease. In many merchant vessels, even these precautions are not taken.

The great probability of the rudder being carried away in very rough weather, when the difficulty of shipping a spare rudder would be great, or when the ship has struck the ground and no time can be spared for constructing and shipping a new one, renders it necessary that, if possible, some means of steering without the proper rudder should be within reach and kept ready at all times to be resorted to. All who are acquainted with the form and construction of screw vessels, will readily see their disadvantages in these respects. Should a screw vessel get a-ground she is very likely to carry away with her rudder her "after-post" and part of her keel, thus precluding the possibility of shipping a spare rudder. Many persons have directed their attention to this subject, and a plan has been proposed for making a rudder the fore-side of the aperture by cutting away a large portion of the deadwood, which would really make the weak weaker.

The plan I propose, and which is practical, but perhaps attended with some disadvantages, is the following:

Fig. 1 represents a sufficient portion of the after-part of a screw ship for illustrating the method of fitting the proposed rudder; R P being the rudder-post, A the aperture to receive the screw propeller. M, N, O, P, is a plate of very thick copper, in wooden vessels, or of iron when the vessel is of that material, fitted closely to the vessel at that part, and made to turn round two pivots, M and N, N passing merely through any eye-bolt; M L being in the same line and passing through the ship's bottom, in such a manner as to be water-tight, terminating

in a square head at L, adapted to receive the key H K (Fig. 2) which may be secured by a forelock. Through the upper part of this key there is a mortise to receive a small



tiller, T (Fig. 3) by means of which the copper or iron plate, M, N, O, P, is made to turn and act as a rudder; the key may be of any length, so as to bring the tiller in a convenient place. There must be a plate fitted in the same manner on the opposite side of the ship. The keys would not be vertical, but that is a matter of no importance; they may be unshipped when not wanted, and the stowage of the vessel would not be interfered with; but upon any emergency the head, L, could be cleared and the keys shipped as well in rough weather as in fine. The thickness of the plates, and also their size, could be adapted to all classes of vessels; it being borne in mind that they are not placed as ordinary rudders, and therefore would not be wanted so large, but as a means of controlling the ship when she would be otherwise uncontrollable. The part of the vessel between M and N is always hollow or else straight, so that the plate would readily turn from the side, which it would not do if that portion were curved the other way. An arris piece may be placed from M to N, to diminish the additional small amount of resistance and to prevent the fouling that might otherwise take place.

I am, Sir, yours, &c.,

W. L.

Portsmouth.

MATHEMATICAL PERIODICALS.

To the Editor of the Mechanics' Magazine.

Sir,—Your correspondent, Mr. Tebay, would much rather be spared the pleasure of seeing my "weak defences." They are become as unpalatable to him as medicines to a recovering patient. He well knows I have nothing to *conceal* with respect to the matters under dispute, and he must have been a little muddled when he imagined I had anything to *admit* with regard to practices which at present concern only the "Friend at Cambridge," and the "Lancashire gentleman." All his efforts to extricate himself from this slough of despond will merely serve to sink him deeper in the mire; for in addition to my former evidences I can now produce, if need require, the testimony of *another* friend (whose name is herewith inclosed), well known to himself, to whom the "Friend at Cambridge" admitted the facts, and "laughed immoderately" when the success of the *trickery* was mentioned in his presence. The allusions to my own practices gain no additional force by his last exposition of their nature. There is a vast difference between voluntarily giving me the *final results* to a question or two of little importance, and furnishing *another* with complete solutions to *fourteen* questions, and afterwards "revising and amending them at Cambridge" when the "gentleman" had written them out as his own!!!

That very pleasant fiction of a system of "mutual exchanges" I have before shown to be a "pure fabrication;" and I only refer to it now, in order to expose another similar attempt at deceiving your readers. I have carefully examined all the periodicals to which I have corresponded, and find no individual with whom I am acquainted who has answered the same questions as myself. Such a circumstance, if it ever happened, must have been purely accidental; and I feel bound to state that this charge is most certainly *another pure invention of his own*, deliberately concocted for want of better means of defence. I think I ought now to ask how it happens that the "Lancashire gentleman" just solves the *same questions* as myself, with the addition of the Prize question? This is the only *coincidence* of the kind I have been able to detect; and I begin to entertain the *suspicion* that the information contained in that letter, *whose receipt is now so conveniently denied*, has been the principal cause of his being placed *just one step in advance*. So mean a subterfuge as denying the receipt of that letter will not serve Mr. Tebay's purpose at this stage of the proceedings; and I feel persuaded he would never have resorted to so extraordinary an artifice, had he not become desperate on finding the current of public opinion so strongly against the practices he has undertaken to defend. I am glad, however, that he has given me the opportunity of placing this additional evidence of their existence upon record, otherwise I should have treated his last miserable effusion with silent contempt. Such desperate shifts always defeat their intended objects, and hence I have determined not again to reply to anything which may be advanced by one who thus

proclaims himself to be so utterly lost to every sense of truth and justice. He may rest assured that all his efforts will not prevent the favourite jackdaws from being stripped of their peacock's feathers. A spirit of inquiry is fast spreading itself abroad, and its promoters will never rest satisfied until the whole of this system of fraud and deception is banished from our periodicals.

I am, Sir, yours, &c.,

T. T. Wilkinson.

Burnley, Lancashire, April 22, 1854.

[We cannot publish any further correspondence on this subject. Ed. M.M.]

WATERPROOF GARMENTS FOR SOLDIERS.

To the Editor of the Mechanics' Magazine.

Sir,—Having been a military man for many years under Napoleon I., I know well the necessities of the soldier during campaigns. Hunger is bad, thirst is worse, want of sleep is very fatiguing, but the worst of all are the evil effects of sleeping on the wet ground in his wet clothes, not only without shelter, but without anything beneath him to preserve his body from the moisture of the soil he lies upon. There can be no wonder at the fact that, often, when he is roused suddenly to meet the enemy, he does so, discouraged by a painful inability to use his limbs with skill and dexterity, though he be naturally as brave as a lion. Speaking then from experience, I suggest that every man in the army be supplied with a bag or long piece of caoutchouc, thoroughly disinfected, perfectly freed from its ordinary disagreeable odour, which would produce feebleness and neuralgic affection. I have seen pieces, treated as I have said, as pure as a cambric handkerchief, and as pliable as a glove; and I am certain that a soldier, by the aid of a garment of such material, might not only retain his health and activity, but also preserve his arms and ammunition perfectly dry.

I am sorry to trespass upon your valuable space; but, seeing the necessity of such an article as I have suggested for the preservation of the lives and health of our army, I could not refrain from addressing this letter to you, in order that the proposal may reach in time the proper quarter.

I am, Sir, yours, &c.,

P. Hillou,

An Old French Soldier.

33, Bucklersbury, April 24, 1854.

[We are able to confirm the statements of our correspondent concerning caoutchouc subjected to the Patent Disinfecting Process. It is deprived entirely of its usual unpleasant odour, and may, indeed, be impregnated with the most agreeable scents. We believe caoutchouc thus treated may, with great advantage, be applied to innumerable novel purposes, and will be found especially valuable to ladies.—Ed. M. M.]

GAS IN DWELLINGS.

To the Editor of the Mechanics' Magazine.

Sir,—I beg to thank your correspondent, Mr. Avery, for his reply to my letter on the above subject; but, as my object was a public, and not a private benefit, I beg to suggest that it would be better that he should communicate his plan through the medium of your widely-circulated Magazine, so that it may undergo investigation by persons more competent to the task than myself.

Since my former letter was written, I have seen the list of subjects for which prizes are offered by the Society of Arts:—"Class 5 to 10, Machinery, 67. For improvements in the employment of gas for domestic purposes, especially for heating, ventilating, and cooking, with the cost and result thereof." This appears to include the desideratum which I have pointed out.

Clericus.

ELLIPTIC COMPASSES.

To the Editor of the Mechanics' Magazine.

Sir,—I have read in last Saturday's No. of your justly-estimated Journal (No. 1602) an abstract of the specification of a patent for "Improvements in the Construction of Compasses;" the invention consisting in a method of constructing compasses which are intended to describe all kinds of geometrical figures. I beg that you will allow me to state, Sir, that the invention belongs to myself, that I am the real inventor, and that Mr. Coleman has not the smallest right to the patent he has obtained for the compasses.

I am, Sir, yours, &c.,

Ed. Lebihan.

11, Goodge-street, Tottenham-court-road.

The Chemistry of Common Life. No. 1.—The Air we Breathe, and the Water we Drink. No. 2.—The Soil we Cultivate and the Plants we Rear. No. 3.—The Bread we Eat and the Beef we Cook. No. 4.—The Beverages we Infuse. No. 5.—The Sweets we Extract. By JAMES F. W. JOHNSTON, M.A., F.R.S., &c. Blackwood and Sons, Edinburgh and London.

THIS series of excellent works has already been highly and justly eulogized by the press. We cannot, however, refrain from expressing our admiration of the successful manner in which the author has attempted to bring before the minds of general readers a scientific exposition of those chemical principles by compliance with which the life and health of the community are sustained. We are quite certain that there are but very few individuals who will not add considerably to the useful knowledge they possess by a careful perusal of these treatises.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BULLOUGH, JAMES, of Accrington, Lancaster, JOHN WALMSLEY, and DAVID WHITTAKER, of Blackburn, same county. *Improvements in machinery or apparatus for warping and sizing, or otherwise preparing yarns or warps to be woven.* Patent dated October 7, 1853. (No. 2293.)

This invention mainly consists in arranging the bobbins in the creel in such manner that half the number of threads shall be on the upper part of the warping creel, and the other half on the lower part of it; the threads taken from the top and bottom part of the creel being thus divided, and a cord or other contrivance being kept between them, it will be easily understood that by passing a lath or stick between the threads and allowing it to pass with them to the front of the mill, the person there in charge may insert the requisite cord to form the lease and then take out the lath or stick, and so repeat the process.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in apparatus for compressing or rarifying air or other elastic fluids.* (A communication.) Patent dated October 7, 1853. (No. 2295.)

This invention consists principally in compressing air or any other elastic fluid by the direct action of water without the usual mechanical parts, such as pistons, cylinders, pump barrels, &c. The apparatus consists of a long bent tube, similar to a syphon, with the orifices upwards, the upper extremity of the short leg of this tube having connected to it a pipe leading from a suitable reservoir or fall of water.

PORTER, JOSEPH, of the Salford Screw-bolt Works, Lancaster, engineer and toolmaker. *Improvements in machines for drilling or boring metals or other substances.* Patent dated October 7, 1853. (No. 2296.)

The peculiarity of Mr. Porter's machine consists mainly in making the screw generally employed to move the spindle longitudinally hollow, that is in cutting the thread on a tube, which is fitted so that it can freely revolve on a spindle, being kept from moving longitudinally upon it by shoulders or collars.

LAMBERT, THOMAS, of Short-street, New-cut, Lambeth, Surrey, brass founder. *Improvements in ships' water-closets.* Patent dated October 7, 1853. (No. 2299.)

The object of this invention is to reduce the splashing over of the water in the basin by the motion of the ship, and the invention consists in constructing the basin in two parts, the upper part and that which comes near the seat being formed conical, and the under basin with its valve or pan, of any of the ordinary forms, and having fitted to it suitable apparatus for moving the valve or pan, and for supplying water to it.

WHITEHEAD, FRANCIS, of Crayford, Kent, draftsman, and WILLIAM WHITEHEAD, of the same place, block-cutter. *Improvements applicable to lanterns, lamps, lamp-shades, and reflectors for reflecting, concentrating, and diffusing light.* Patent dated October 7, 1853. (No. 2301.)

This invention consists in covering the reflecting surfaces with a white enamel or glaze, or some vitreous preparation which will adhere to the metal, and will not be liable to be injuriously acted upon either by the atmosphere or the heat given off from lamps or burners; the surfaces when so prepared can always be kept clean with ease by merely wiping them over with a wet cloth.

ARCHER, ALEXANDER EDWARD DUDLEY KNOX, clerk to William Betts, of Wharf-road, City-road, capsule manufacturer. *Improvements in apparatus for applying metallic capsules.* Patent dated October, 8, 1853. (No. 2302.)

The inventor makes use of a ring of gutta percha or other suitable material possessing a certain amount of elasticity, but at the same time of such hardness that it will force the capsule into indentations formed on the neck of the bottle or other vessel placed within it.

KRAUT, HENRY, of Zurich, Switzerland, engineer. *Improvements in stands for casks and barrels.* Patent dated October 8, 1853. (No. 2304.)

Claim.—The application of springs made of steel, caoutchouc, or other suitable material, for the purpose of effecting the tilting of casks or barrels, such springs tilting the casks or barrels in consequence of the diminution of the weight or contents of the latter.

DENTON, JOSEPH, of Presturch, near Manchester, Lancaster, mechanical engineer. *Improvements in looms for weaving.* Patent dated October 8, 1853. (No. 2305.)

This invention consists in giving motion to the riser by a peculiarly shaped pinion fixed on the end of the crank shaft, or by a toothed wheel fixed on a slub bolted to the frame, and causing it to slide in and out so as to act upon a star-wheel that gives motion to the levers that raise each of the shuttle boxes at the proper times.

DUBS, HENRY, of Vulcan Foundry, near Warrington, Lancaster, engineer. *Certain improvements in the manufacture of wheels and tyres, and also in the construction of furnaces employed in such or similar manufactures.* Patent dated October 8, 1853. (No. 2306.)

The first part of this invention consists in forming the wheel of a pile of rings with their two ends meeting, the ends of the different rings not being placed opposite each other; and the second part consists principally in the adaptation to the furnace employed of a reflector or concave cover formed of fire clay or other suitable material.

SMARTT, GEORGE LIFFORD, of Enfield, Middlesex, chemist. *Improvements in vessels for preserving leeches and fishes alive.* Patent dated October 8, 1853. (No. 2308.)

This invention consists of an improved construction of vessel, having a pipe in the bottom of it for introducing fresh air and allowing the waste water to escape, and a distributor or spreader in the cover of it for distributing the water supplied to the vessel over the perforated lid.

POTTS, WILLIAM, of Birmingham, Warwick. *Improvements in mantel-pieces.* Patent dated October 8, 1853. (No. 2309.)

Claim.—The combination of metal-work deposited, or partly deposited, by the processes of electro-metallurgy with marble or stone-work.

PLIMPTON, HENRY RICHARDSON, and JAMES LEONARD PLIMPTON, of Massachusetts, United States. *A new and useful article of furniture to serve the purpose of a bedstead, toilet-table, or a wash-stand and a writing-desk.* Patent dated October 8, 1853. (No. 2310.)

This invention consists in so combining the parts of a bedstead and toilet-table, that when not in use they can be easily placed in a small space, and at the same time form, to all appearance, a secretary, bookcase, or other similar piece of furniture.

MAY, CHARLES, and JAMES SAMUEL, both of Great George-street, Westminster, civil engineers. *Improvements in joining the ends of the rails of railways.* Patent dated October 8, 1853. (No. 2311.)

This invention consists in effecting a more perfect union of the ends of rails by welding. The patentees arrange grooved rollers or tools in a portable machine in such manner, that when the ends of two rails at a welding heat are brought together and are held stationary, the rollers may be moved to and fro, and caused to press upon and thus produce a welding of the parts.

CLAYTON, HENRY, of the Atlas Works, Upper Park-place, Dorset-square, Middlesex, machinist. *Improvements in the manufacture of bricks and tiles.* Patent dated October 8, 1853. (No. 2312.)

This invention consists in constructing each moulding orifice with two moving and two fixed surfaces, the moving surfaces consisting of rollers which are put in motion by the passage of the plastic earth between them; the interior of the moulding orifice where the rollers come being arranged so as to direct the plastic matter between the rollers.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improvements in fire-arms and cartridges.* (A communication.) Patent dated October 8, 1853. (No. 2313.)

The main feature of this invention relates to the placing of the caps upon the nipple, and consists in the use of a tube which contains the caps, and in which they are forced towards a delivery aperture by a spring or its equivalent, in combination with a contrivance in which the nipple is placed on a vibrating breech, so that in the act of turning the said breech to receive the charge, the nipple shall be brought to the end of the priming tube, in order that a cap may be forced upon it by the spring.

WILSON, GEORGE FERGUSSON, of Belmont, Vauxhall, managing director of Price's Patent Candle Company. *Improvements in treating wool and fabrics composed of wool.* Patent dated October 10, 1853. (No. 2316.)

Claim.—The combining castor-oil with oleic acid, or with oleine of palm-oil, and using them in the preparation and treatment of wool, and fabrics composed of wool.

WILSON, GEORGE FERGUSSON, of Belmont, &c. *Improvements in the manufacture of candles and night-lights.* Patent dated October 10, 1853. (No. 2317.)

Claim.—The employment in the manufacture of candles and night-lights of a combination of unbleached stearine of palm

oil with cocoa-nut oil, or its stearine and fatty acids.

WILSON, GEORGE FERGUSSON, of Belmont, &c. *Improvements in the manufacture of soap.* Patent dated October 10, 1853. (No. 2318.)

Claim.—The employment of purified cocoa-nut oil, and also of stearine of cocoanut oil, in the manufacture of soap.

WARNER, FREDERICK, of John Warner and Sons, Crescent, Jewin-street, City, and JOHN SHOTTON, foreman of John Warner and Sons. *Improvements in the manufacture of great bells.* Patent dated October 10, 1853. (No. 2319.)

The inventors build up a core and coat it with loam, as heretofore, or make the core of a casting of iron coated with loam, but instead of making the outer mould from a pattern-bell produced on the core, as formerly practised, they employ a vessel (preferring one of cast iron,) perforated with numerous holes, and of a size somewhat larger than the intended bell, within which vessel they apply a coating of loam, and by a suitable strike or pattern produce the desired form of mould.

BROOMAN, RICHARD ARCHIBALD, of 166, Fleet-street, London, patent agent. *Improvements in railway switches.* (A communication.) Patent dated October 10, 1853. (No. 2320.)

This invention applies to the class of switches that are operated by the approaching train, and is intended especially to enable the train to change the switch from a "turn out" to the regular track. The rails, sleepers, ties, &c., are of the usual construction, but instead of having a simple bar sliding upon a tie, to carry the moveable end of the changing rail, a beam of wood or metal is used, which is hollowed on the under side, so as to play along a suitable bearing piece resting upon the sleepers and sustaining the weight.

BEARDMORE, WILLIAM, of Deptford, Kent, engineer, and WILLIAM RIGBY, of Glasgow, Lanark, engineer. *Certain improvements in steam engines.* Patent dated October 11, 1853. (No. 2326.)

Claim.—"The adoption of an air-pump plunger in connection with the piston, which plunger works through both ends of the air-pump chamber, and forms an efficient and suitable guide for the angular thrust of the connecting rod."

SHARP, JOHN COLIN, of Paisley, Renfrew, North Britain, engineer. *Improvements in retarding apparatus for the prevention of accidents on railways.* Patent dated October 11, 1853. (No. 2328.)

The main claims are,—1. A mode of effecting a simultaneous brake-action throughout the carriages or wagons of a train, by means of steam pressure applied through continuous lengths of inflexible piping communicating with each other through the agency of flexible junction pieces. 2. A mode of retarding railway trains, by means of steam cylinders disposed one on each carriage or wagon, and put in continuous communication with each other.

WORRALL, JAMES, jun., of Salford, Lancaster, dyer and finisher. *Certain improvements in the method of dyeing fustians and other textile fabrics, and in the machinery or apparatus connected therewith.* Patent dated October 11, 1853. (No. 2329.)

Claims.—1. "The passing of two or more pieces of fustian and other textile fabrics simultaneously through the dyeing liquor, and then over geered or drawing-through or other rollers. 2. The employing a heated steam pipe to separate the pieces previously to their passing over the said rollers. 3. The employing a perforated pipe to separate the pieces either previous to or after they have passed over the said rollers. 4. The introduction of a steam cylinder in one or more of the becks to heat the dyeing liquor and the cloth as required."

ROWLEY, CHARLES, of Birmingham, Warwick. *Improvements in ornamental dress fastenings.* Patent dated October 11, 1853. (No. 2330.)

These improvements mainly refer to a mode of forming and applying spring shanks to studs, dress pins, &c., and consist in making the shaft of pins hollow, and inserting a piece of steel or other wire within the hollow of the pin, the inner wire being provided with a part projecting through a slot in the pin, so that the inner one may be moved up and down, the lower end of the inner wire being formed into a barb point.

NALDER, JAMES HALL, of Alvescott, Oxford, farmer, and JOHN THOMAS GNAPP, of Clanfield, same county, machinist. *Improvements in winnowing or dressing corn.* Patent dated October 11, 1853. (No. 2331.)

This invention consists in the use of a revolving screen, which is a cylinder of wire or other suitable material, and is caused to revolve by any convenient means, the grains or seeds in their progress through it being effectually cleansed from all extraneous matter, as the air is forced from the fan through the centre of the screen.

CAMPBELL, WILLIAM MUIR, of Glasgow, Lanark, North Britain, furnace builder. *Improvements in earthenware kilns.* Patent dated October 11, 1853. (No. 2332.)

Mr. Campbell's kiln is circular, and has a single furnace under the bottom, supplied with fuel from the outside, and communicating by its flue with a central vertical

flue, from which latter a series of horizontal flues radiate outwards, and carry the heat directly through the mass of articles to be burned.

MUNTZ, WILLIAM HENRY, of Massachusetts, United States. *A new and useful improvement in paddle-wheels for navigable vessels.* Patent dated October 11, 1853. (No. 2334.)

This paddle-wheel is composed of three rims, of which the central one is larger in diameter than the other two, and is placed midway between them, floats being arranged angularly around these rims.

WEBSTER, JAMES, of Leicester, engineer. *Improvements in water-gauges for steam boilers.* Patent dated October 11, 1853. (No. 2335.)

This invention consists of applying a hollow float, with a hollow stem rising through an opening in the upper part of a steam boiler, in which opening a metal tube is fixed, having a long slit at each of two opposite sides. In this metal tube a strong tube of glass is fixed, within which the upper part of the stem of the float rises and falls freely, according to the variations in the level of the water.

PORTER, JOHN FRANCIS, of Bessborough-street, Middlesex, civil engineer. *Improvements in the moulding of bricks and other articles of like materials.* Patent dated October 11, 1853. (No. 2336.)

Claim.—"The combination of the machine and the filling a mould or moulds with clay, or brick earth, by means of a pair of rollers, which force the clay and compress it therein."

COUVAN, BERNARD, of Fenchurch-street, London. *Improvements in giving signals on railways.* Patent dated October 11, 1853. (No. 2337.)

The object of this invention is to arrange apparatus for communicating signals by sound to the driver of a coming or following train, in cases where another train is stopped. For this purpose bells or sounding instruments are placed at suitable distances apart on a railway, and proper wires or connections and pulls are applied.

GOBLE, GEORGE FREDERICK, of Fish-street-hill, London, civil engineer. *Improvements in apparatus for signalizing and stopping railway trains.* Patent dated October 12, 1853. (No. 2338.)

This invention consists mainly in suspending from the engine a flap which would strike against any obstacle placed on the rails, and thereby be caused to act upon the steam-whistle, or to sound a bell.

MORISON, JOHN, and DANIEL HURN, both of Norton Folgate. *Improvements in the manufacture of nose-bags.* Patent dated October 12, 1853. (No. 2339.)

Claims.—1. Forming a nose-bag woven in one piece, with a selvaged opening, so as to give an uniform strength to all parts of it, by doing away with seams and strengthening trimmings. 2. The coating of the lower parts of nose-bags with gutta percha, or other plastic material, for the purpose of protecting and waterproofing them.

CLARK, PATRICK, and ALEXANDER CLARK, both of Gate-street, Lincoln's-inn-fields, Middlesex, engineers. *Improvements in revolving shutters and other closures for portable and other buildings.* Patent dated October 12, 1853. (No. 2341.)

Claims.—1. Constructing the metal laths of which revolving iron shutters are made with beads or projecting ribs. 2. Forming the joint-pins of metal lath shutters out of the solid bead. 3. Forming the joint-pin of metal laths, by perforating a slot near the edge of such laths. 4. Rolling the iron for metal lath shutters with projecting rivet-pins, with which the joints or hinges are to be fixed. 5. The application of water or other similar fluid under pressure to the raising and lowering of revolving shutters, and also the application of compressed air for a like purpose. 6. Facing or covering wood laths with iron or other metal, in the construction of portable and other houses.

MAUMÉNE, EDME JULES, of Rheims, France, professor of chemistry. *Improvements in the treatment of lignite or wood-coal, and in obtaining various other useful products therefrom.* Patent dated October 12, 1853. (No. 2343.)

The patentee carbonizes lignite, and then, by various processes, manufactures from it a black pigment; a substance suitable for decolourizing solutions of sugar and other such solutions; artificial fuel; a volatile oil and napthaline paraffine and similar products, such products being without the peculiar disagreeable odour which is possessed by similar products obtained from coal-tar.

WAITHMAN, ROBERT WILLIAM, of Bentham-house, York, gentleman. *Improvements in apparatus for applying paint, varnish, and other liquid substances, and also for cleaning carriages, ships, roadways, houses, and other buildings.* Patent dated October 12, 1853. (No. 2344.)

Claim.—The application to brushes, mops, brooms, or other such apparatus of a reservoir for the material that is to be used therewith, for the above purposes, whether such reservoir be formed in the article itself, or be an additional apparatus connected thereto.

BRADLEY, GEORGE, of Castleford, York, gentleman. *Improvements in stoppers or covers for bottles, and in the tools or apparatus for manufacturing the same.* Patent dated October 12, 1853. (No. 2346.)

The inventor claims,—1. Forming the stopper with a flange or flanges that bear against the under side of a corresponding flange or flanges formed on the neck of the bottles, and thereby hold the stoppers firmly in their place. 2. The use of a core-pin, composed of fixed and moveable pieces, for forming the interior of bottle stoppers or covers.

*** No. 2303 has not yet been advertised in the *Gazette*.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

FERGUSON, JAMES, of Glasgow, Lanark, North Britain, and JAMES LILLIE, of the same place, tailors. *Improvements in trousers and similar articles of dress.* Application dated October 7, 1853. (No. 2294.)

In this invention the waistband of the garment has inserted in it a piece of elastic fabric so disposed as to form a portion of the back of the waistband, and to supersede the use of braces.

ONIONS, JOHN, of Park-terrace, and SAMUEL BROMHEAD, of Marlborough Estate, both of Peckham, Surrey, engineers. *Certain improvements in steam-engine boilers.* Application dated October 7, 1853. (No. 2297.)

These improvements consist in making an irregular surface to the interior of the fire-box, the fire-bars being constructed of curved tubes, so as to feed the boiler with heated water.

MATTHIAS, WILLIAM JAMES, and THOMAS BAILEY, of Seckford-street, Clerkenwell, Middlesex, clock-makers and co-partners. *Improvements in obtaining power by mechanical means.* Application dated October 7, 1850. (No. 2298.)

This invention consists of an attempt to increase motive power by means of an arrangement of axles, eccentrics, cog-wheels, and star-wheels.

CORLETT, ROBERT JAMES, of Monmouth, gentleman. *Improved machinery for preparing or scutching flax and other fibrous materials requiring such an operation.* (A communication.) Application dated October 7, 1853. (No. 2300.)

In carrying out this invention the flax is held in a holder and suspended between stationary jaws and passages, passing through other jaws, which have a short quick oscillating motion about a centre, so that the flax, &c., is beaten backwards and forwards between the stationary and the moving jaws at the same time that the holder is caused to rise gradually and draw up the fibres.

WILKINSON, WILLIAM, of Nottingham, framework-knitter. *Improvements in protecting telegraph wires.* Application dated October 8, 1853. (No. 2307.)

This invention consists in laying insulated wires in longitudinal corrugations formed in an iron band, and in covering the wires so laid with corrugated iron flaps.

MARYON, ROBERT JAMES, of York-road, Lambeth, Surrey, gentleman. *Improvements in the construction of anchors.* Application dated October 10, 1853. (No. 2314.)

This invention consists in applying a rest piece for the inside of the palm to bear on, and in forming the shank of different forms (one of these being tubular,) so as to reduce the weight without diminishing the strength of the anchor.

RAWSON, HENRY, of Leicester, manufacturer, and THOMAS WHITEHEAD, of the same place, mechanic. *Improvements in regulating the flow of air to steam boiler furnaces.* Application dated October 10, 1853. (No. 2315.)

These improvements consist in regulating the quantity of air admitted to furnaces by the pressure of steam in the boiler, which is caused to pass into a cylinder or chamber, where it acts upon a piston or moveable cover, which may be weighted as required, and is connected to the valve or regulator of a pipe, through which the air passes to the furnace.

PATTINSON, HUGH LEE, of Scot's-house, near Gateshead, Durham, chemical manufacturer. *Improvements in the manufacture of sulphuric acid.* Application dated October 10, 1853. (No. 2321.)

This invention consists in mixing with the factitious pyrites, described by the inventor in the specification of a previous patent, a quantity of free sulphur (the Sicilian or other sulphur ordinarily burnt for the production of sulphuric acid), and burning this mixture in the common pyrites kilns.

KNOWLES, JAMES, of Eagley-bank, near Bolton-le-Moors, Lancaster, coal proprietor. *Improvements in machinery for regulating the velocity of steam engines, and other motive power engines.* Application dated October 11, 1853. (No. 2322.)

These improvements consist in attaching two ratchet-wheels to the spindle of an ordinary throttle-valve, and in placing in a line with each ratchet-wheel a click hinged to a lever or rod, to which a constant to-and-fro motion is given by the steam-engine to be governed; the clicks move to and fro beyond the reach of the ratchet wheels, so long as the engine is running at its proper velocity; but when the velocity becomes excessive, the governor moves the click up to the ratchet-wheels, and the valve is closed.

KEMP, HENRY, of Barkam-terrace, Southwark, gentleman. *Certain improvements in the preparation of wood for sheathing ships, as a substitute for copper and other*

metals; also in house, ship, and pier building, &c., &c. Application dated October 11, 1853. (No. 2323.)

This invention consists in immersing wood in a solution of barytes, prepared by calcining barytes with charcoal, and in then submitting it to a pressure sufficiently great to fill the pores of the wood with the solution. After this, it is allowed to become nearly dry, and is then placed in a tank containing sulphate of copper in solution; after which it is dried for use.

Wilkinson, William, of Nottingham, framework-knitter. *Improvements in bands, belts, and straps.* Application dated October 11, 1853. (No. 2324.)

The inventor places one or more layers of woven wire cloth between flat strips of gutta percha, or gutta percha combined with other materials, and then subjects the strips, while warm, to pressure.

Demoulin, Louis Alexandre Farjon, of Rue Sedaine, Paris, France, engineer. *Improved apparatus applicable to carriages on common roads, for the prevention of accidents and increasing the power of locomotion.* Application dated October 11, 1853. (No. 2325.)

In this invention the motion from left to right of a handle moves certain levers from right to left and raises a catch, disengaging it from the teeth of a wheel fixed on the nave of the wheel of the carriage, and thus replacing an iron hoop which forms a drag.

Dick, David, of Paisley, Renfrew, North Britain, machinist. *Improvements in the manufacture of flexible tubes or pipes.* Application dated October 11, 1853. (No. 2327.)

These tubes are made by enclosing a copper or other metallic coil in some elastic casing, as vulcanized India rubber or gutta percha, so that the elastic material may be strengthened.

Harris, James, of Hanwell, Middlesex, engineer. *Improvements in apparatus for heating water and other fluids.* Application dated October 11, 1853. (No. 2333.)

The apparatus described by the inventor consists of a vertical or other vessel fitted with a series of tubes similar to the boilers of locomotive engines, with a second or false cover at each end, thus forming chambers for the admission of the steam and the exit of the air and condensed water. The false covers are made moveable for convenience in fixing the tubes and effecting repairs when needful.

Smith, Thomas, of Lambeth, Surrey, potter. *An improved method of making pipes.* Application dated October 12, 1853. (No. 2342.)

This invention consists mainly in submitting newly-formed pipes before burning to a regular and considerable pressure, whereby the whole material is consolidated and air and superfluous moisture driven out.

Mapple, Henry, of Child's-hill, Hendon, Middlesex, and Daniel Moore Mapple, of Sydney-street, City-road, Islington, Middlesex. *An invention for electric telegraphic purposes, being an improved printing and signal electric telegraph, with an electric-alarum attached.* Application dated October 12, 1853. (No. 2345.)

In this invention the printing is effected by causing a type-wheel to revolve by means of one or more permanent or electro-magnets made to vibrate in front of an electro-magnet, thereby bringing the required letter to the point required.

Gibson, John, of Bloomfield-road, Paddington, Middlesex, civil engineer. *Improvements in fixing tyres on railway wheels.* Application dated October 12, 1853. (No. 2349.)

This invention consists of making the felloes of railway wheels with angular projections and the tyre with corresponding angular hollows, and with a projecting rib or fillet, in such manner, that when the tyre is hot and expanded, it may receive the two angular projections into the hollows, and, by shrinking, close upon them, the rib or fillet being then closed down at intervals.

PROVISIONAL PROTECTIONS.

Dated March 6, 1854.

533. David Barr, clerk, Sudbrook-park, Richmond, Surrey. An improved combined hair-brush and comb.

Dated March 11, 1854.

588. James Cooper Hall, of Monkwearmouth, Durham, shipowner. An improved windlass.

Dated March 28, 1854.

712. John Woodward, of Acton-street, Middlesex, office clerk. Certain apparatus for stopping shot and other holes in ships and vessels.

714. Alfred Hodgkinson, of Springfield Bleach Works, Belfast. Improvements in bleaching linen fabrics.

716. Henry Francis, of West Strand, Middlesex, engineer. Improvements in machinery for crushing, grinding, washing, and amalgamating quartz, and other matters containing gold or silver.

718. Frédéric Chambon and Alfred Meyniac, of Chaylard (Ardèche), France. Improvements in bleaching or scouring silk.

720. Ellis Rowland, of Manchester, Lancaster, engineer, and James Rowland, of the same place, manufacturing chemist. Improvements in the manufacture of certain metallic springs.

Dated March 31, 1854.

738. Jean Marc Gustave Coste, of Passy, near Paris, France, chemist. Revivifying animal charcoal that has already been used, and obtaining by a peculiar process prussiate of potasse or soda from it.

739. Archibald Douglas Brown, of Glasgow, Lanark, North Britain, cabinet-maker. Improvements in beds, couches, and other articles of furniture.

740. Henry Homewood and John Gregory, both

of Mount-street, Lambeth, Surrey. An improved fire-escape.

742. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. An improved manufacture of carpet. A communication.

743. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improved mode of manufacturing carpets. A communication.

Dated April 1, 1854.

745. Frederick Sampson Thomas, of Cornhill, London, and Hook's-villa, Fulham, Middlesex, gentleman. Certain improvements in locomotive engines.

747. Sir Robert Juckes Clifton, of Clifton-hall, Nottingham, baronet. An improved percussion-shell.

749. Auguste Edouard Loradoux Bellford, of Castle-street, London. A new and useful fabric for boot and shoe soles, machine banding, and other purposes. A communication.

753. William Smith, of the firm of Smith, George, and Company, or Witney, Oxford, woollen manufacturers. An improved mop.

755. William Kestell, of Burnham, Berks. An improvement in fixing or cementing glass to metal.

Dated April 3, 1854.

757. Thomas Scott, of Brighton, Sussex, gentleman. Improvements in machinery for propelling.

758. James Forsyth, of Caldbeck, Cumberland, spinner. Improvements in machinery for preparing and spinning wool and other fibrous substances.

759. Pierre Alexis Francisse Bobœuf, of Castle-street, London. The application of electricity and fixed or moveable aerostation to military strategy and pyrotechny.

760. William Ashdown, of Piccadilly. Improvements in gas-stoves.

761. Richard Edward Hodges, of Southampton-row, Russell-square, Middlesex. Improvements in connecting wheels, drums, cylinders, and pulleys, with their naves, axes, and the parts thereof one to the other.

762. William Gossage, of Widnes, Lancaster, manufacturing chemist. Improvements in the manufacture of certain kinds of soap.

763. Giuseppe Devincenzi, of Grosvenor-street, Middlesex, gentleman. Improvements in producing ornamental and figured surfaces and surfaces for printing from, also the hardening or preparing of certain objects to be employed in the process.

764. Charles Walker, of Bury, Lancaster, engineer. Improvements in steam engines, and in apparatus applicable to safety-valves for steam boilers.

Dated April 4, 1854.

765. John Gurney, of Bradford, York, woolstapler. An improvement in machinery or apparatus for spinning wool and other fibrous materials.

766. James Higgin, of Manchester, Lancaster, manufacturing chemist. Improvements in the mode or method of separating metals from each other when in conjunction, and in obtaining useful products therefrom.

767. John Swarbrick, of Baxenden, near Accrington, Lancaster, engineer and millwright. Improvements in steam boilers.

768. Joseph Bentley, of Liverpool, Lancaster, gun manufacturer. Improvements in breech-loading fire-arms.

769. Henry Seebohm, of Bradford, York. Improvements in preparing and combing wool, goats' hair, alpaca, cotton, and other fibrous material.

770. George Seaborn Parkinson, of Westbourne Park-road, Middlesex, gentleman. Improvements in railway-breaks.

771. Bernhard Samuelson, of Banbury, Oxford. Improvements in machinery for cutting turnips and other vegetable substances.

772. Robert Brisco, of Low Mill-house, Saint Bees, Cumberland, Esquire, and Peter Swires Horsman, of St. John's Beckermet, in the same county, gentleman. Certain improvements in heckling machinery.

773. Henry Young Darracott Scott, of Queen's-terrace, Woolwich, Kent, Captain in the Royal Engineers. An improved mode of manufacturing cement.

774. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improved machinery for raising and forcing fluids. A communication.

775. François Gustave Benoit Capouillet, of Brussels, Belgium, manufacturing chemist. Improved apparatus for generating heat by the combustion of bituminous or resinous substances. A communication.

776. James Edward M'Connell, of Wolverton, Buckingham, civil engineer. Improvements in wheels, axle-boxes, and brakes for railway carriages.

777. John Hamilton Glassford, of Glasgow, Lanark, lithographer. Improvements in lithographic and zincographic printing.

Dated April 5, 1854.

778. Henry Blatter, of Paris, France, watchmaker. An improved mode of constructing thermometers.

779. William Gilpin, of Moorgate-street, London, contractor. Improvements in electrical communication.

780. George Ross, of Falcon-square, London, merchant. An improved mode of preventing the alteration of bank bills from one denomination to another. A communication.

781. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improved apparatus for printing piece goods or fabrics. A communication.

783. Constant Bekaert, of Paris, Rue des Martyrs. Improvements in machinery for doubling, twisting, and winding flax, silk, cotton, hemp, wool, and other fibrous substances. A communication.

784. Jonathan Harlow, of the Bordesley Works, Birmingham. Improvements in the manufacture of metal bedsteads.

785. Stephen Randoll Smith, of Hanover-terrace, Cumberland-road, Bristol. Improvements in vessels and apparatus used for raising sunken vessels and other bodies in the water, and for lowering materials for structural purposes in water.

787. William Rumsey Gillard, of Kirby-street, Middlesex, bookbinder. An improved method of colouring and ornamenting leather, vellum, book-edges, paper, and other like substances employed in book-binding.

Dated April 6, 1854.

788. John Weston, engineer and builder, of Norwood, Surrey. Improvements in transmitting and applying motive power for propelling railway-trains, ships, boats, barges, and such like vessels, and for other useful and mechanical purposes.

790. William G. Craig, of Newport, Monmouthshire, engineer. An improved mode of making communications between the commander and the engineer, or the helmsman, or other person on ship-board.

792. Joseph Nash, of Thames-parade, Pimlico, Middlesex, chemist. The manufacture and refining of sugar.

794. Auguste Edouard Loradoux Bellford, of Castle-street, London. Improvements in sewing-machines. A communication.

796. Emile Dupont, of Boulogne-sur-Mer, France. Improvements in the manufacture of certain cements.

798. Josef Chanes, of Davies-street, Berkeley-square. An improvement in the manufacture of ribs of umbrellas and parasols, and of busks and substitutes for bones of stays and dresses.

800. Julian Bernard, of Club-chambers, Regent-street, Middlesex, gentleman. An improved mode of stitching, or uniting and ornamenting various materials, and in machinery or apparatus for the said purpose.

802. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. A revolving, blowing, and ventilating water-extractor for drying cloth. A communication from T. F. King, of New York, America.

Dated April 7, 1854.

805. Alfred Tylor, of Warwick-lane, London. Improvements in moderator-lamps. A communication.

806. Henry Moss, of Mansfield-street, Cavendish-square, Middlesex, gentleman. An auriferous quartz washing, pulverising, crushing, separating, and amalgamating machine.

808. Peter Armand le Comte de Fontainemoreau, of South-street, London. Certain improvements in the preparation of photographic paper. (A communication.)

809. Louis Francois Saugrin, of Paris, France, photographist. Improvements in the construction of stereoscopes.

810. Robert Harling, of Clerkenwell, mechanist. Certain mechanical arrangements for multiplying power.

811. Jonathan Jopling, of Bishopwearmouth, Durham, smith and ironfounder. Improvements in preserving the tuyere used for blowing in forge and other furnaces from the action of the fire.

812. William Henry Bentley, of Bedford, engineer. Improvements in irrigators or machines for watering grass and other lands, roads, floors, flowers, plants, shrubs, and trees, and applicable for all purposes for which ordinary watering-pots are employed, parts of which improvements are also applicable to pumps for raising and forcing liquids.

813. Thomas Wood, of Rumford-street, Oxford-street, Manchester, engineer. Improvements in centrifugal machines.

814. John Rankin, of Liverpool, Lancaster. Improvements in machinery for cleaning corn and seed.

815. Henry Bollman Condy, of Battersea, Surrey. Improvements in concentrating beer, ale, cyder, wine, and vinegar.

817. John Robert Johnson, of Stanbrook-cottage, Hammersmith, Middlesex. Improvements in the manufacture of type and other raised surfaces for printing.

818. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. An alkaline steam-washing apparatus. A communication from T. F. King, of New York, America.

819. William Rigby, of Manchester, Lancaster, engraver. Certain improvements in machinery or apparatus for engraving metallic cylinders or rollers, employed for printing calico and other surfaces.

820. William Naylor, of Norwich, engineer. Improvements in locomotive engines.

821. William Naylor, of Norwich, engineer. Improvements in power hammers.

822. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improvements in producing stereoscopic pictures, and in the apparatus for exhibiting such or similar pictures. A communication.

823. Thomas Whitehead, of the firm of Taylor, Wordsworth, and Co., of Leeds, York, machine and tool-makers. Improvements in machinery for preparing, combing, drawing, and spinning wool, flax, cotton, silk, and other fibrous substances.

824. John Corlett, of Luimbres, France, engineer. Improved machinery for preparing or scutching flax and other fibrous materials requiring such an operation. A communication from Benjamin Delattre, of Setques, France.

825. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements applicable to the manufacture of weavers' harness. A communication.

Dated April 8, 1854.

829. William Worby, of Ipswich, Suffolk. Improvements in machinery or apparatus for separating grain from straws, broken off ears, husks, and other refuse, after being thrashed.

831. Charles Butler Clough, of Tyddyn Mold, Flint. Improvements in the manufacture of coffins.

833. George Savage, of Stoke-Bruen, Northampton, brick and tile maker. Improvements in the manufacture of bricks and roofing tiles.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

870. William Ridgway, of Hanley, Stafford, earthenware manufacturer. Improvements in the construction of ovens and kilns. April 15, 1854.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," April 21st, 1854.*)

2708. William Greaves. An indicator alarum applicable to railways and railway trains.

2721. Charles Frederick Stansbury. An apparatus to be attached to a drill for sowing grain or other seeds, for the purpose of mingling guano or other pulverised manure with the grain or seed to be sown, and depositing it in the ground at the same time with the seed, thereby greatly diminishing the quantity of guano or other manure required to produce the best fertilizing effects. A communication from Thomas Frederick Nelson, of Clarke county, Virginia, America.

(*From the "London Gazette," April 25th, 1854.*)

2665. William Ashton. Certain improvements in machinery or apparatus for manufacturing braid.

2748. John Henry Johnson. Improvements in the production of printing surfaces. A communication.

2800. James Reilly. Improvements in machinery or apparatus for tenonting, mortising, and sawing wood, metal, or other materials.

2804. Alexander Brown. Improvements in metallic casks and other vessels.

2829. John Coope Haddan. Improvements in the manufacture of cartridges and of wads or wadding for fire-arms.

2892. Christian Schiele. Improvements in preventing undue oscillation in engines, machinery, carriages, and other apparatus.

2915. Benjamin Whitaker. Improvements in the manufacture or production of useful toys.

2986. Jean Daniel Pfeiffer. Improvements in machinery or apparatus for cutting paper and similar materials.

2988. Joseph Gaultier. An improved apparatus for washing and bleaching.

3002. John Parkinson. Improvements in governors for regulating the pressure of steam, gas, and other fluids or liquids.

3020. Claude Alphonse Roux. Improvements in printing warps of cut pile and similar fabrics.

3027. Joseph Marlor. Certain improvements in

ascending and descending mines and shafts, and in the apparatus connected therewith, by which said improvements the ventilation of mines is increased.

3037. Joseph Holbrey. Improved machinery for combing wool and other fibrous materials.

3044. François Aristide Clerville. An improvement in the construction of fire-arms.

11. James Stovold. Improvements in machinery or apparatus for sifting and washing gravel, or other similar substances.

16. Thomas Mann. An improved cinder-sifting shovel.

29. Isaac Pearse. Improvements in means for navigating ships or other vessels.

80. John Bethell. Improvements in manufacturing coke.

87. William Eassie. Improvements in trucks used on railways.

98. James Newall. Improvements in machinery or apparatus for stopping or retarding the progress of railway and other carriages, and in the mode or method of connecting two or more carriages with the said apparatus together.

114. William Blackett Haigh. Improvements in machinery or apparatus for tennoning, mortising, slotting, cutting, or shaping wood or metal.

130. Thomas Webb. Improved apparatus applicable to the annealing of glass and the firing of pottery ware.

133. Francis Parkes. A mode or method of fixing tools and implements in helves or handles.

139. Auguste Edouard Loradoux Bellford. Certain improvements in cutting out cloth and other fabrics and materials suitable for garments and furniture. A communication.

371. Cromwell Fleetwood Varley. A new arrangement or apparatus for transmitting electric telegraph signals.

383. George Smith. Improved machinery for retarding and stopping railway carriages.

582. Alfred Vincent Newton. Improvements in the mode of purifying coal gas, and of obtaining during the manufacture of the gas a certain purifying material, and in apparatus to be used in purifying gas. A communication.

624. Antoine Edouard Paschal Le Gros. Improvements in preserving timber, and generally all kinds of wood.

640. Alexander Hendry. An improvement in heating bakers' ovens.

661. Joseph Perkins. Improvements in metallurgy, especially applicable to the production of type and ornamental forms.

687. Alfred Lister. Certain improvements in the manufacture of metallic castings.

691. Herbert Room. A new or improved method of ornamenting metallic bedsteads, and such other articles of furniture as are or may be made of metal.

718. Frédéric Chambon and Alfred Meyniac. Improvements in bleaching or scouring silk.

731. John Sandys. Improvements in electric telegraph instruments.

737. Alfred Vincent Newton. An improved construction of hone. A communication.

739. Archibald Douglas Brown. Improvements in beds, couches, and other articles of furniture.

742. William Edward Newton. An improved manufacture of carpet. A communication.

743. Alfred Vincent Newton. An improved mode of manufacturing carpets. A communication.

766. James Higgin. Improvements in the mode or method of separating metals from each other when in conjunction, and in obtaining useful products therefrom.

775. François Gustave Benoit Capouillet. Improved apparatus for generating heat by the combustion of bituminous or resinous substances. A communication.

780. George Ross. An improved mode of preventing the alteration of bank bills from one denomination to another. A communication.

781. William Edward Newton. Improved apparatus for printing piece goods or fabrics. A communication.

785. Stephen Randell Smith. Improvements in vessels and apparatus used for raising sunken vessels and other bodies in the water, and for lowering materials for structural purposes in water.

792. Joseph Nash. The manufacture and refining of sugar.

823. Thomas Whitehead. Improvements in machinery for preparing, combing, drawing, and spinning wool, flax, cotton, silk, and other fibrous substances.

825. Alfred Vincent Newton. Improvements applicable to the manufacture of weavers' harness. A communication.

828. Henry Kemp. Certain improvements in the preparation of wood for planking and sheathing ships and other vessels, also in house, ship, and pier building, railway sleepers, &c., and all other purposes whatsoever, where wood is required.

870. William Ridgway. Improvements in the construction of ovens and kilns.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed April 21, 1854.

2431. Christopher Cross and Jas. Crosby.
2434. Charles Nicolas Michel and Augustin Lecomte.
2435. Jean François Felix Challeton.
2441. Harry Bentley.
2448. Henry Kraut.
2452. Edward John Montagu Archdeacon.
2493. Joseph Gurney.
2541. Frederick Lipscombe.
2547. Peter M'Gregor.
2695. Emanuel Wharton.
2703. Robert Sibbald.
2731. James Lovell.
2741. Alexandre Andre Victor Sarrazin de Montferrier.
2817. John Gwynne and James Egleson Anderson Gwynne.

1854.

109. Henry Holland.
257. James Cotton Hargreaves and Jas. Fletcher.
319. John Taggart.
359. Arthur Jonson.
369. George Fergusson Wilson.
377. George Fergusson Wilson.
385. Joseph Hinchliffe, junior.
401. John Chisholm.
403. Harvey Hilliard.
405. William Milner.

407. John Urie.
409. Frederick Osbourn.
423. William Chas. Theodor Schaeffer.
441. Peter Fairbairn.

Sealed April 24, 1854.

2451. Charles Brewster.

Sealed April 25, 1854.

2459. John Drumgoole Brady.
2465. William Bottomley.
2468. Marcus Davis.
2470. George Gower Woodward.
2481. James Thomas George Vizettelly.
2482. Amédée François Rémond.
2487. William Vaughan, John Scattergood, and Charles Grimshaw.
2498. John Walker Wilkins.
2660. James Bristow and Henry Attwood.
2946. Robert Whewell.

1854.

28. Alfred Vincent Newton.
180. William Massey.
228. John Henry Johnson.
234. Luther Young and Edwin Marten.
262. Henry Watson.
274. Edward Howard and David Porter Davis.
388. Moses Poole.
416. Ernst Gessner.
452. Edward Hammond Bentall.
466. John Elden.

NOTICES TO CORRESPONDENTS.

A. C. E., Sarum.—Condensers are generally formed of cast iron from seven-eighth's of an inch to one inch thick. The surface of the condenser of one of Her Majesty's steamers whose cylinders are sixty-four and a-half inches in diameter, and length of stroke thirty-six inches, is one hundred and thirty-four square feet.

R. Dixon.—Mr. Willard has left this country, we believe, for Canada; we cannot therefore send your letter to him.

J. Hope.—The plan of your fire-escape is good, but requires perfecting.

J. M., Aberdeen.—Yours will probably be inserted in our next.

C. J. Recordon.—Yours is received with thanks.

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Mechanics' Magazine.

No. 1604.] SATURDAY, MAY 6, 1854. [Price 3d. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

WHITELAW'S HORIZONTAL WATER-WHEEL.

Fig. 1.

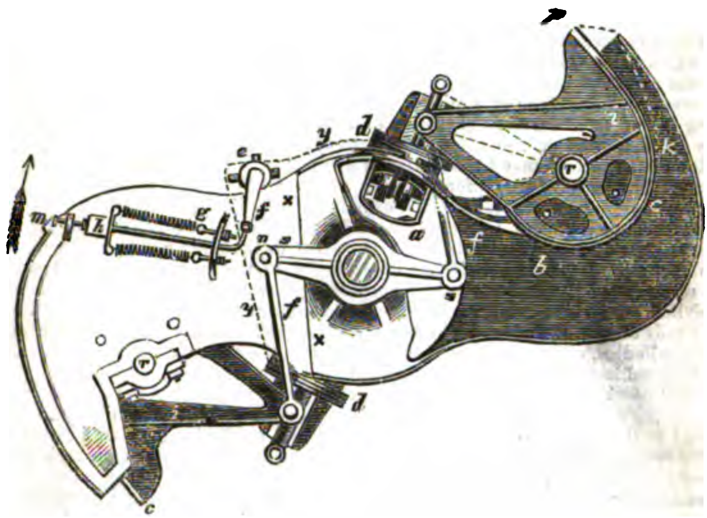
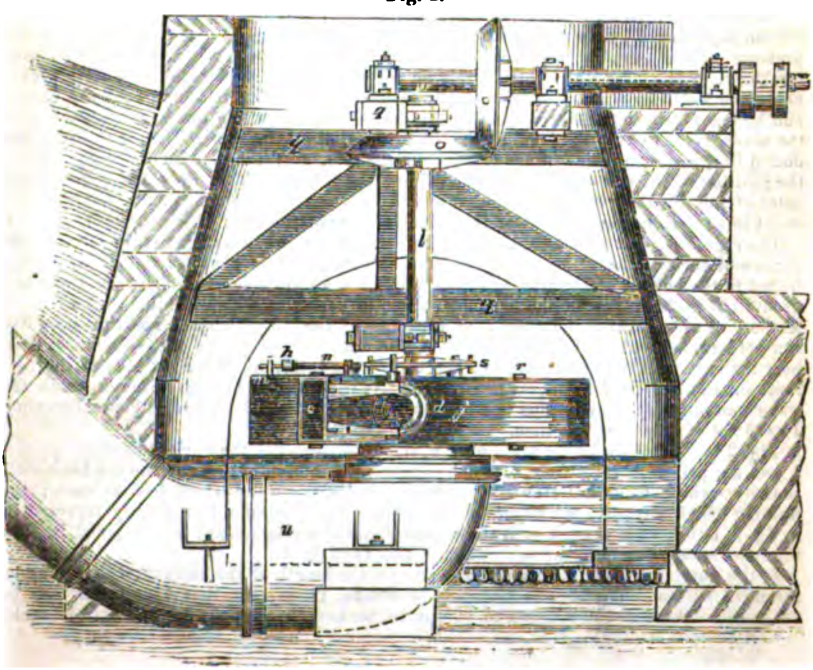


Fig. 2.



WHITELAW'S HORIZONTAL WATER-WHEEL.

To the Editor of the Mechanics' Magazine.

SIR,—As you were good enough to insert the description I sent you of my high-velocity steam engines, I now forward to you an account of my improved horizontal water-wheel.

Fig. 1 is a plan of the water-wheel, partly in section. On the right side of that fig., are shown part *a*, of the central opening for the water, an internal view of, *b*, one of the two arms, the governor-valve, *c*, and the cylinder, *d*, with one of the pistons for working the valves. On the left side of the fig., an external view of these and some of the other pieces are represented. *e* is a small four-way cock, worked by the lever, *f*, and, *m n*, a flat rod, which has a weight, *h*, fastened on it. This rod slides in guides, as represented, and is at the inner end connected by a pin to the end of the lever, *f*. To a cross piece on the rod, *m n*, one end of each of a pair of spiral springs is hooked, and the other end of each spring is connected to an eye at the end of a small screwed pin, *g*, fastened to the innermost guide for the rod, *m n*, and by means of nuts these pins are adjustable, so that the tension of the springs may be increased or diminished, so far as is required to allow the water-wheel to revolve at its proper speed.

One of the pipes of the stop-cock, *e*, communicates with the inside of the arm; the water escapes from the cylinder, by a pipe placed opposite the one now referred to. By one of the pipes at the side of the cock, the water is passed to the inner end of both cylinders, and from the pipe on the other side the water is led to the outer ends of the two cylinders. The thick dotted lines, *y*, show the pipes leading from the stop-cock to the outer ends of the cylinders, and the two thick lines, *x*, represent the pipes which communicate with the inner ends of both cylinders. The two pipes last spoken of are jointed to the outer ends of the cylinders, and the water passes from them to the other end of the cylinders, through a hole bored in a strip or rib cast outside of each cylinder.

It will now be seen, that if the springs are adjusted to the proper extent, the centrifugal force of the weight, *h*, will, when the water-wheel goes too fast, cause the rod, *m n*, to carry the end of the lever, *f*, outwards, and when the wheel revolves at too slow a rate, the tension of the two springs will pull that rod, so as to make the lever of the stop-cock turn in the opposite direction. This being the case, if the stop-cock and the connections with it and the ends of the two cylinders are properly formed, the pistons being pressed by the water from the arm, will, by acting on the levers marked *i*, open the two valves, or close them, as the case may be, just far enough to maintain the proper speed of the wheel.

The wheel revolves in the direction indicated by the arrow, and, as is well known, its motion is produced by the reaction of the water escaping from the jet orifices and by the pressure of the water in the arms. I may add, that the valves turn on the gudgeons, marked *r*. *s* is a lever which fits loosely on the water-wheel shaft; each end of this lever being connected by a rod, *t*, to a pin fastened on each of the levers which work the valves, and by this arrangement the one valve is prevented from travelling quicker or slower than the other, so as to keep the jets, or the jet orifices, at all times of the same width. The dotted line, *k*, drawn inside of the jet-piece of the arm, on the right side of the fig., shows the position of the end of the valve when shut; the arc, *p*, is that in which the extreme point of the valve moves; and the other dotted lines at the place named, are put there to assist in explaining the motions of the valve and that of the lever which works it.

The regulating-valves are packed with leather. One piece bears against the face or side surface of the rim, near the inner end of each valve, and is kept in its place by a plate bolted to the outside of the arm, as represented on the right side of the fig., and there is a groove cut in the middle of the top and bottom of each rim, which is filled with a strip of leather, so as to prevent the water from escaping at the places named, and thus no water can get away, except by the jet-orifices. A line drawn in the middle of the thickness from near the outer end to the inner end of the rim of the valve, on the right side of the fig., represents one of the four gooves referred to. As the water-tight joint through which the water passes from the main pipe to the arms has already been described in your Magazine, I need not explain it at this time.

Fig. 2 is a side view of the main pipe, *u*, the water-wheel, *j*, the upright shaft or spindle, *l*, and the pair of bevel wheels, *o*, which transmit the motion of that shaft to the horizontal shaft, *w*, which communicates it to the machinery the water-wheel has to work; the framing which supports the whole is marked *q*. The governor is not fully represented in fig. 2, but there is enough of it there to explain the arrangement; and to assist in this, the same letters point out the same parts in this as in fig. 1.

If the water-wheel is used for working pumps, the length of the horizontal shaft may be extended till room for three or more sets of cranks, the same as that represented, can be got. When three is the number of pumps to be kept in motion, the one set of cranks

should be placed at an angle of 120° to the other, and the last or outermost crank should be set at this same angle to the pair before it, in order to maintain the strain on the water-wheel and the eduction pipes as uniform as possible.

Writing down 120° brings to my mind an absurd practice engineers and others have got into, of taking the sign of minutes to represent feet, and that of seconds for inches, thus: as the diameter of the main pipe, represented in fig. 2, is 6 feet 4 inches, they, in marking it, would write 6′ 4″; this is not right, as 6′ 4″ means 6 minutes 4 seconds. A simple and small mark for feet, and one of a similar kind for inches, certainly is wanted, and it might be as well to have a suitable mark for yards also. Now, as the marks for degrees, minutes, and seconds are easily made, and would occupy but little room on a drawing, they might be used, if placed in this way: °10 ′2 ″5·5, which might express 10 yards, 2 feet, 5½ inches; and if the place the figures have to go in is small, they might be placed close together, thus: °10′2″5·5. Some draughtsmen place their accents somewhat above the left side of the figures, but I dare say this is more a consequence of easy habits than of anything else, and does not indicate what is intended to be done correctly.

Fig. 1 is drawn to a scale of ¼, and fig. 2 to a scale of ⅛ inch to a foot; so a pretty correct notion of the dimensions of the principal parts may be ascertained.

The wheel represented in figs. 1 and 2 is for a fall of 22 feet, its power is 200 horses, and the speed 48 revolutions per minute. It in most respects resembles a water-wheel of that power that I am making for Messrs. Gwynne and Co., Engineers, London, which is to work six single-acting pumps, of 20 inches stroke and 8¾ inches diameter, to raise water to a height of 460 feet, for irrigating an estate. When finished, I believe, no water-wheel in the world will be of greater power than this; but be this as it may, it will be a large one.

A correct idea of the construction of the horizontal wheel has now been given, but as different powers, heights of falls, &c., require different forms of arms and governors from what are represented above, it is not all that might be written on the subject, though I may have said enough, as the different forms of the wheel and many of the modifications of its parts are described in Nos. 913, 1004, &c., of your Magazine.

Two falls of 32 or 33 feet keep in motion two 30-horse power horizontal water-wheels, which work economically and well in other respects, and may be seen at work in two of Mr. Platt's cotton factories, at Hadfield, near Manchester. Mr. Richard Butterfield, Bradford, has a wheel like Mr. Platt's, so far as the power, the form of the arms, and the height of the fall are concerned. 19 feet is the height of the fall, and 3½-horses the power of a wheel Mr. W. H. Pemberton, Holt, Norfolk, has worked for about six years. Mr, Helliwell, Kitson-wood Mill, near Todmorden, a number of years ago, got from me two wheels of considerable power for a fall of 180 to 200 feet; 6 feet is the diameter, and 7 *revolutions per second*, or 420 revolutions per minute, is the speed of these wheels, which have performed well ever since they were set in motion. Mr. Dove, Nutshill, Hurlet by Glasgow, has on his farm a 4 to 5-horse power wheel, made and erected by me more than twelve years ago, and which has done all his work since that time. Below* are the names of parties in Greenock who have horizontal water-wheels, some of which I erected more than twelve years ago; it is at least six years since the last was set to work, and the whole of these wheels work well and give great satisfaction.

The parties referred to in the note will, I dare say, show their wheels to any gentleman who may wish to see them; or, if written to, they, I have no doubt, will return a satisfactory answer to any questions that may be asked; and as the first wheel Mr. Platt got from me is in the same place, and turns the machinery, that a good overshot wheel of about 40 feet diameter by 6 feet wide in the buckets once worked, he can give an account of the efficiency, the uniformity of the speed, and the way in which the new wheel works in connection with his steam-engine, as compared with the performance in these respects of the overshot wheel; and as the second wheel Mr. Platt got has a governor of the kind described in this letter, he can give his opinion respecting it also. I could refer to many other parties, were it not that it appears to me, that the list below is not too short for your Magazine; but I dare say you will allow me to add, that Mr. Harrieson, C.E., Frocester-court, Stroud, Gloucestershire, can give an account of how a horizontal wheel he has had in operation for a length of time does its work.

The following table, which contains the results of a series of experiments made with a small horizontal reaction water-wheel, will give your readers some idea of the efficiency of that kind of motion.

* Messrs. Fleming, Reid, and Co.; Mr. Houston, dyer; Mr. John-Poynter, drysalter; Messrs. Patten, sugar-refiners; and Messrs. Macnab and Clark, engineers. To these gentlemen I may add Mr. Hollins, Pleasley Works, Pleasley, Mansfield; Mr. Wm. Peel, Taliaris Park, Llandillofawr, Carmarthenshire; Mr. Wm. Thompson, Hazlewood-hall, Tadcaster, Yorkshire; the Culcreuch Spinning Company, Glasgow; and J. Macnab, Midton, Paisley.

No. of Experiments.	Revolutions of Wheel per Minute.	Weight on Friction Brake in Ounces.	Ounces of Water used by the Wheel in one Minute.	Power of the Wheel, that of the Water being 100.
1	000·0	45·50	4923	00·00
2	138·0	24·50	7130	74·92
3	153·5	23·50	7557	75·41
4	173·5	22·50	8141	75·76
5	194·0	21·50	8761	75·21
6	203·0	20·50	9041	72·72
7	214·0	19·50	9389	70·21
8	222·0	18·50	9644	67·28
9	229·0	17·50	9872	64·13
10	294·0	00·00	12040	00·00

63·46 inches is the height of the fall or column of water which actuated the wheel, and the radius or length of the arm of the friction brake the wheel was tested by is 15·96 inches, and the radius, or the length of the arm of the wheel, is about the same as that of the brake.

75·76, the co-efficient of effect as shown by the fourth experiment, is high, seeing that the wheel is so very small. Other experiments which I made with a rather larger wheel gave results higher than those contained in the table. The water used was carefully measured in a box. The horizontal reaction wheel gives out more of the power of the water, and transmits it better, than any other kind of water-wheel, and the action of the governor is very perfect.

In my account of the new steam engine published in your 1601st Number, I forgot to mention that the expansive principle therein explained may be advantageously applied to blowing-engines. In engines of this kind the initial pressure of the air on the piston in the pumping cylinder is nothing; and the pressure keeps increasing on that piston as it moves towards the other end of the cylinder, while the pressure of the steam, if it were worked expansively, would diminish from near the beginning to the end of each stroke; and it will be evident that this can be compensated for in the way I have pointed out, as well as in the sort of engines referred to, as in all kinds of pumping and other engines hitherto thought unworkable on the expansive principle to any great extent, unless assisted by a very heavy fly-wheel to counteract certain effects of the variable pressure on the piston or pistons. If the steam cylinder and that of the pump have a vertical position, as is generally the case in blowing engines, and the power is transmitted through a sway beam from the piston in the first-mentioned to that in the other cylinder, part of the extra weight should, as before explained, be put on the steam cylinder piston, and the rest on the end of the beam next the pump; but if the engine is a direct acting horizontal engine, and say that it is to work air or other pumps, or something of that sort, the extra weight should all be put on the piston in the steam cylinder, or it will do well if part of it is put there, and part on the outer end of the piston-rod. The fact is, the expansive principle may be applied to every kind of steam engine.

Some time ago a party in Ireland who made one of the turbines of M. Fourneyron, fabricated a story to show that its coefficient of effect is 91 or 92, and got it circulated in a *petite vogue* work, published in Glasgow. Of course no one, unless he be of the genus who think, as brother Jonathan apparently does, that the sea-serpent was killed by the Irish, or those who are of opinion that there is great virtue in the "Industrial Resources of Ireland," including its "peat moss," believes in what they have said; and were it not that the editor of the work referred to looks after pretty good paper and print, and uses stoutly the "our" and the "we," peculiar to authors no bigger than himself, the deluded followers in the 92 per cent. train would not have been numerous. It appears to me strange that stuff which would degrade Russia should come out of Ireland to be published in Glasgow. But having now got past the fun of the affair, I shall say something in earnest about the turbine.

M. Fourneyron not long ago told Mr. Fairbairn that the highest result he had got from his turbine is 62 per cent. of the whole power of the water, though at one time he thought its efficiency was much higher than this; and as M. Fourneyron's statement looks like a true one, it does not appear likely that in Ireland they are able to make his motor do more with a vengeance. Again, I can tell the party first referred to, that not one or all of them put together can construct a jet piece from which 95½ per cent. of the whole reactive force of the water will pass, or which will allow the water to pass through without depriving it of 4½ per cent. of its power. Now, as in M. Fourneyron's turbine there are two sets of jet pieces, one in the stationary, the other in the moveable part, $4\frac{1}{2} \times 2 = 9$, and $100 - 9$

= 91, more, or at least as much power is lost in passing the water through the jet-pieces of the turbine, as in Ireland they wish it to be believed that the entire loss in the turbines made there no more than comes up to. But besides the loss in the jet pieces, there is that caused by the velocity of the escaping water not being the same as that of the jet orifices, and the loss occasioned by the circumference of the revolving part working in the water which passes from it; and again, a deal of smashing, mixing, and frothing takes place at "the meeting of the waters," or where the water which issues from the stationary part and that in the revolving part come together. All this kind of thing worries up power, and shows that even M. Fourneyron has not underrated the performance of his hydraulic motor. It is the height of nonsense to write of peat and other industrial resources, if the industry, energy, and every good thing required to bring them out does not belong to the Irish in Ireland.

I am, Sir, yours, &c.,
JAMES WHITELAW.

13, Ronald-street, Glasgow, April 22, 1854.

ROYAL SOCIETY.—THE MORALITY OF ITS MEMBERS.

(By the Reviewer of Mr. Babbage's "Exposition of 1851." Ante, vol. lvi., page 30.)

(*Concluded from page* 391.)

The Report states: "It appears from this publication" (adverting to Sir James South's letter), "that the Rev. Richard Sheepshanks stands charged by one of the Fellows of the Royal Society with—

"1. Having caused the name of Troughton to be forged upon a foreign instrument, in order to pass it through the Custom-house as an English instrument.

"2. That Mr. Sheepshanks committed this forgery for the purpose of defrauding the revenue.

"3. That Mr. Sheepshanks applied to Mr. Troughton to allow him to suborn one of his workmen to perjure himself by swearing that the French instrument was made by Troughton.

"4. That, failing in this, Mr. Sheepshanks either succeeded in getting some other person to swear to that falsehood, or did it himself."

"All comment," said the interrogator, "on such conduct, when pursued by a Fellow of the Royal Society and a clergyman, is superfluous. The question I wish to put, through the President, to the Rev. Richard Sheepshanks, is simply this—

"Is any one of those charges true?"

The Report informs us that the Rev. Mr. Sheepshanks admitted the truth of the first two charges, namely, that he had caused the name of Troughton to be forged on a foreign instrument in order to pass it through the Custom-house as an English instrument, and that he had committed the forgery for the purpose of defrauding the revenue. He proceeded so far, adds the Report, as to adduce arguments in their justification, relying principally on the fact that he had been for several years a *law student*. Lawyers must feel that they are under peculiar obligations to the reverend accused for the alleged fact of his justification. His legal studies must have had a singular effect upon his moral perceptions, if they led him to be a forger for the purpose of defrauding the revenue. This, it seems, was one of the results of his legal labours. However, he has since been converted into a divine. According to the reverend *gentleman's* own account of his transactions with the Custom-house, his divinity has practically taught him the maxim that

"The pleasure is as great
Of being cheated as to cheat."

His illustrations of this philosophy or divinity in reference to the Custom-house were to the purpose, and showed that the reverend professor of the doctrine had made himself master of the subject.

We have been informed, on good authority, that the reverend accused so far pleaded *ad misericordiam* as to avow that he would not again commit forgery to defraud the revenue. When he was a *law student*, and attended the Old Bailey Sessions, storing up the necessary stock of lore, no doubt he discovered that almost all culprits, when convicted, very solemnly declare they will never do it again; the useful knowledge that the quondam law student then acquired comes to his aid most opportunely.

Mr. Sheepshanks, the Report states, denied the third and fourth charges, and declared that the conversations with Troughton were mere falsehoods of Sir James South's. On this latter point, we have Sir James South's assertion on the one side, and the Rev. Richard Sheepshanks' denial on the other; but, taking the admissions of the latter into consideration, we think probability very materially assists us in forming a judgment as to who speaks the truth.

The accused admits that Troughton's name was forged on a foreign instrument, and that the parties who had committed the forgery and fraud had the unparalleled, though perhaps characteristic, audacity to

leave the smuggled instrument at Troughton's own shop: at all events, these facts are not "*all bosh.*"

Is it then probable that Troughton would see a smuggled instrument in his shop, with his name unjustly forged on it to make it pass for his own, without feeling annoyed and indignant at it? Would anyone see such a disgraceful fraud perpetrated to his injury, and then impudently put under his nose, without denouncing the forgers and cheats in the angry terms which Sir James South alleges that Troughton very naturally employed on the occasion? Ninety-nine out of every hundred instrument-makers, under the same circumstances, would have expressed themselves in similar terms; and, therefore, we have strong reason to believe that Sir James South's account of his conversation with Troughton is substantially correct, and that the pious culprit's assertions to the contrary are what he so elegantly and clerically terms "*all bosh.*"

The Report states that the reverend accused denied the third and fourth charges. The third charge, it will be recollected, was that Mr. Sheepshanks had applied to Mr. Troughton to allow him to suborn one of his workmen to perjure himself by swearing that the French instrument was made by Troughton; the fourth charge was, that failing in this, Mr. Sheepshanks succeeded in getting some other person to swear to that falsehood, or did it himself.

In attempting to prove that these charges are unfounded, the Report informs us that the reverend accused gave this account of the affair: "That he requested a friend, who was paying a visit to Paris, to procure for him a Borda's reflecting circle from Jecker; that he further directed Troughton's name to be engraved on the circle, in order that the instrument might enter free of duty (which he considered unjust and exorbitant), and without giving any trouble to the gentleman who took charge of it. That the instrument was accordingly introduced *without paying duty*, and was left by his friend at Mr. Troughton's shop. He justified this conduct by stating that "the revenue had often cheated him, and he had cheated the revenue;" but that, upon the whole, he was a loser by these transactions.

In the commencement of this article we adverted to a defence which the reverend accused had long ago promised to publish. Why does he so strangely and suspiciously delay its publication? The charges are perjury, forgery, and fraud. If the accused really desires to clear himself from these heinous imputations, he must produce his friend whom he darkly shadows out in his attempt at exculpation. That friend, by his own account, must know the whole transaction. Troughton suspected him, and the reverend accused's justification confirms Troughton's suspicion. Why, then, is not the friend, who assisted in the whole affair, produced, and called upon to give his version of the disgraceful business. Clearly, the *arcades ambo* ought to have been in the dock at the same time, and have held up their pious hands together in answer to the charges. The Rev. Mr. Sheepshanks denies that he himself personally smuggled the instrument through the Custom-house, or that he had made either an oath or declaration that it was of English manufacture. Here, again, to confirm this assertion, and to render it at all credible, he should produce his friend, who knows the whole transaction, and can therefore say who did make the oath or declaration before the forged instrument was allowed to pass through the Custom-house. The friend kept behind the scenes can say whether he took the oath himself, or hired some one to perjure himself for a consideration.

We have seen, by the extract from Mr. Babbage's work, that the reverend accused once threatened him with injury in the hope of inducing him to modify the evidence that he had given on oath. With this fact, in all its detestable traits, on record uncontroverted, we think it is only reasonable to press on that pious *gentleman* for the production of his friend and chief coadjutor in this debasing affair, so that it may be ascertained whether that friend spontaneously accomplished the perjury, the forgery, and the fraud, or whether he was the innocent dupe of his principal, or whether he acted under the duress of Mr. Sheepshanks' usual threats of "injury," "discrediting," or "*putting down.*" At all events, the friend who is alleged to have done so much in this really infamous affair should be produced; for, however pious and repentant the long-promised defence may happen to be, it cannot be satisfactory without the personal testimony of his clandestine accessory. Until the friend be brought forward, and has given his account of the mean transaction, Mr. Sheepshanks must bear all the odium. It is strange that he delays the attempt to do himself a sort of negative justice by producing his friend, and proving, if he can, that there is at least one other person as unscrupulous as himself.

Having discussed some of the chief points in the Report, we may perhaps be allowed to notice some rather peculiar incidents which occurred at the Anniversary Meeting of the Royal Society, when the matter was brought to its notice. The reverend culprit had one or two distinguished advocates to defend him: not hired ones, perhaps, but apparently voluntary pleaders, who seem-

ingly acted as *amici curiæ* on their pious friend's behalf. We are told that shortly after Mr. Babbage had commenced his address, and was about to put his questions with respect to forgery, perjury, and fraud, the Astronomer Royal got up, and, interrupting Mr. Babbage, began by saying, "that his object was to prevent any question from being put to his friend Mr. Sheepshanks."

Now what was the subject matter of inquiry, and who was the personage attempting to stifle it on behalf of his friend? The subject was that forgery and perjury had been perpetrated for the purpose of defrauding the public revenue. The voluntary and anxious advocate for the accused was the Astronomer Royal, the chief public scientific officer in the kingdom, who, in stipend, pension, and emoluments, receives £1,300 a-year of the public money, and who has managed to have £450 a-year paid, also from the same stock, to an accommodating subaltern, termed an assistant, for performing official duties which the Astronomer Royal's predecessors used to do themselves for one-fourth of the sum which is paid to him. However, the *Queen's astronomer* attempted to stop all inquiry as to whether *Her Majesty's revenue* had been defrauded or not; and the *Public's highest scientific officer* exerted himself to stop questions tending to show whether the *public revenue* had been cheated or not. The *truth* as to whether the crimes of forgery and perjury had been committed for the purpose of defrauding the revenue appeared to form no part of the Astronomer Royal's advocacy: he courageously came to the rescue of his friend, setting aside his duty to the public, whose tolerably well-paid servant he is. His exuberant feelings of friendship do him credit. His notion of public honesty and regard for the credit of British science, is another question. The Astronomer Royal, as the voluntary pleader for his friend in difficulty, thought the least said about the damaging affair the better; and therefore, quite overlooking the fact that the character of the Royal Society, of which he is a ruling member, was involved in the charges, he urged that his friend should not be tortured with questions on the matter. It must have been, one may suppose, a severe test of moral courage, for an officer holding so high and responsible a public post, and paid so handsomely for its superintendence as the Astronomer Royal is, to become the advocate of a person accused of forgery and perjury, committed for the purpose of defrauding the public revenue. There is, perhaps, an explanatory clue to that gentleman's extraordinary undertaking on the occasion. The reader will have learned, from the extracts from Mr. Babbage's work, that Professor Airy was a fellow-labourer with his reverend friend Sheepshanks years ago, in the unfortunate quarrel between Sir James South and Mr. Troughton. Mr. Babbage says, p. 167, "I have now traced the connexion of the Rev. R. Sheepshanks (who had avowed his determination '*to discredit me*,' and also to '*attack me on another subject at a future time*'), through his friend the Astronomer Royal, with the Government." During a lengthened period, it seems, the Astronomer Royal and his friend the pious culprit had been furtively working together to damage Mr. Babbage with the Government: the well-matched pair had been hunting him in a couple, "*to put him down*." The Astronomer Royal has availed himself of the position that he holds in the public service to give his reverend and pious friend's malice practical operation through the Government influence; and, as a *quid pro quo* for this congenial patronage and assistance, the other has on all occasions acted as the Astronomer Royal's tool and defender. Whenever anyone has deemed it his duty to find fault with the official conduct of the Astronomer Royal, his reverend man Friday has always been prompt to defend with tongue and pen, and has generally covered his patron's retreat with a shower of very clerical vituperation. The Astronomer Royal, in the discharge of his public duties, has found it expedient to keep a defender. The selection of his Hector evinced some tact, but the choice was not a chivalrous one: it is not knightly to employ a man for a bully who has procured himself to be dyed black for the purpose of assuming the profession of a minister of peace, because, although the tongue of such a reverend layman, or lay-parson, be as smutty as his coat, one cannot kick him; calumniate how he may, the slanderer's skin is safe—his arrogated profession protects him; hence the Astronomer Royal's *alter ego* has uttered his threats to put down with impunity. The Queen's Astronomer, for his pious friend's serviceable aid in defending him, does not omit to repay him, as is evident from his advocacy at the Royal Society's meeting. Another mode of repayment, is by flattering, almost invariably and pre-eminently, his pious friend's inordinate vanity. Accordingly, the Rev. R. Sheepshanks is, almost invariably and preeminently distinguished in the Astronomer Royal's Greenwich Reports as having some instruments at the Observatory of marvellous perfection or wonderful utility; just as though Great Britain could not duly furnish its national observatory without the gratuitous assistance of the Rev. Richard Sheepshanks. Will the Board of Visitors inquire

at their next meeting whether the Royal Observatory was made a depository for the Jecker instrument bearing on it the evidence of forgery, perjury, and fraud? They might also intimate to the Astronomer Royal that the country can very well supply every instrument necessary for the duties of the Observatory, and that it ought not to be a part of his duty to permit anyone, whether lay or clerical, or a hybrid something between the two, to make that institution the place of deposit for instruments, taking the chance and running the risk of his obtaining them honestly or fraudulently.

The Astronomer Royal, like his pious friend the accused, is an adept in bringing his spite to bear on anyone who happens to offend him; we have seen that he, like his reverend defender, is prone to bite in the dark. Another instance may be given of this amiable propensity. The Astronomer Royal, as his office would lead one to expect, bears sovereign sway at the Astronomical Society, and his pious and *fidus Achates* is, consequently, the sole *arbiter elegantiarum* of that Society: not one of the very considerable number of scientific men, who do not belong to the clique which the pair just mentioned govern, would stand the smallest chance to be admitted into that Society. Some time ago, a cultivator of astronomy was proposed for admission. It was conjectured that he had made some unpalatable strictures on the Astronomer Royal's official conduct with respect to a brilliant discovery: upon this conjecture, the Astronomer Royal's watchful and pious Hector discharged his duty to his patron in his usual manner. But this was not all: it is customary for the certificates of each candidate to be openly suspended in a room of the Society, so that any member who pleases may have an opportunity to sign the testimonial of each candidate that he knows. The Astronomer Royal, at the time referred to, was the President, and, in that capacity, he ordered the Under Secretary to put aside the peccant candidate's certificate, so that it might have no chance of being signed in the usual manner. In this case the Astronomer Royal, as President of the Society, had the manly courage and the "safe malignity" to give this stab in the dark, well knowing at the time he did it that the person whom he so furtively insulted was two hundred miles distant. This is another example of the Astronomer Royal's aptitude for "*putting down*," and a fair one of his spiteful "discrediting." Upon the whole, his advocacy of his friend was characteristic and becoming: the advocate was worthy of his accused client, and the devout culprit deserved such a pleader; each, in his way, was dignifying the station that he held, and both were mutually honouring their patrons. "*Noscitur à sociis.*"

When Mr. Babbage had put the four charges in the categorical order in which they are printed above, and submitted the question to the accused, through the President—"Is any one of these charges true?" the Report informs us that the President stated that he had previously consulted the Council upon the case, and that, after due consideration, they recommended that he should not put any questions to Mr. Sheepshanks on the subject.

We entirely exculpate the noble President from all participation in this extraordinary decision. Except the barely formal part officially cast upon him, he no doubt performed his duty by simply inquiring of the Council what he, as President, should do in the disgraceful matter; and the Council, *after due consideration*, advised their distinguished chief to put no questions. Ask no questions, and you will be told no untruths, was the cautious advice of the Council of the Royal Society touching one of their *confreres* accused of offences of the deepest die.

However, their criminated fellow had promised to publish his defence: very likely they were solicitous to learn what he had to say to those atrocious charges before he was openly pressed with interrogations upon them. We are willing to believe that the Council wished to become acquainted with the vindication which the accused had given them to understand he had been so long assiduously preparing, before he was put to the rack by being publicly questioned on the offences by the President of the Society. We trust their advice to their President arose from this kind of partiality to the accused member, and in commiseration for his unhappy position, and that they had no desire to make themselves a sort of accomplices after the fact, implying that such offences, when committed by a prominent member of the Society, lose their culpability, and that the Council are ready to share the public odium with the culprit. We would fain believe that this is not the case, but that the Council are waiting for the promised defence, and for the appearance of the "friend" who assisted so materially in the affair. There can be no defence entitled to any credibility whatever unless the *friend* comes forward, and states candidly the part which he acted: when that has been done, the Council of the Royal Society, it is hoped, in regard to their own reputation, but more especially for the credit of British science, will act in the matter so that justice may be done to all parties.

It is understood that the subject of this discussion was brought to the notice of the

Board of Visitors of the Royal Observatory in June last. The forgery, the perjury, and the fraud, were alleged to have been committed by one of their body; and yet, if report be true, they have taken no steps to mark their sense of the scandalous affair. Surely the Board cannot tacitly admit that nothing has been done amiss; for were that the impression, if one member of the Board may be guilty of such offences with impunity, as far as the general feeling of the Board for its own honour is concerned, it would follow that more of their members, or all of them, might do the same, and then the Board of Visitors would claim peculiar notice; but this view is not within the bounds of credibility. No doubt the Board had been informed that a defence was preparing—that a friend assisted in the transaction, and that the defence and friend might wipe off the apparent turpitude of the alleged offences from the accused member of their body. Here again the defence and assisting friend are obviously required; the reverend culprit must perceive, one might suppose, that his defence and friend must be produced at all risks. The matter cannot be permitted to be smothered: the credit and character of our chief scientific society are involved in the scandalous business. A clergyman has been publicly accused of the crimes of perjury, forgery, and defrauding the public revenue; it would be a disgrace to the country, and abominably unjust to the criminated person, were there no foundation for the charges. British justice demands that the accused be allowed to clear himself of the imputations if he can—his countrymen wish to afford him fair play. He has every aid at his command to assist him in wiping off the odious accusations. But, on the other hand, all attempts to raise a dust, so that the accused may escape under the artificial cloud, will prove futile. The public will not be baulked and outwitted by such practical audacity. We call upon the public bodies abovementioned, either to see that their colleague is cleared from the weighty imputations cast upon him, or to mark their sense of his conduct.

According to common report, the pious accused's patrons have conferred on him posts of various kinds. He was one of the commissioners to settle the boundaries of boroughs under the Reform Bill. No doubt his deep theological lore properly qualified, and what is more to the purpose, procured for him that very clerical engagement. He is, we believe, a commissioner for the establishment of equal weights and measures, on which, it is said, he is busily experimentalizing. He is very fitly chosen to make the imperial scales for British Justice to use—will they at last bear a forged name or a real signature? His next engagement in a public capacity should be to devise a method to prevent the Customhouse from being defrauded by forging English makers' names on foreign instruments.

Upon the topic of commissioners, we may remark, that clergymen form a profession having many peculiar immunities. There is a vast sum of national wealth set aside for their especial maintenance and advantage; there is ample room for parsons' *governmental friends* to promote them in their own profession, instead of making them unseemly poachers on the rights and just privileges of others. Two-bottle parsons, who have the necessary interest, are thrust into all kinds of legal and other commissions. We think (and we shall return to the subject again), those clerical poachers on the domains of other professions are no credit to their cloth, and that their patrons, who convert them into this *tertium quid* sort of officials, display more personal partiality for a jovial companion than public wisdom by making them so. Why, for instance, have not the Rev. Richard Sheepshanks' friends, whom he is said to direct in the putting down line, consistently promoted him in the profession to which he assumes to belong? Why have they not made him a bishop? The Report at once proves the pious man's fitness for the high office, and that he possesses excellencies which Mr. Horsman has not yet discovered in his anatomy of the right reverend bench. Should his patrons bestow a mitre on their devout Mentor, all that can be said now is, that the bishop and his makers will necessarily reflect exactly the same kind of honour upon each other.

We have done. Thanks to the independance and moral courage of the *Mechanics' Magazine*, which enabled us to expose and denounce the detestable "putting down system," which had been for so many years pursued with such implacable and unremitting malignity towards Sir James South, Mr. Babbage, and other victims that we know and can name. Thanks to the same Journal for permitting Sir James South to publish the information which has led to the Report so many times referred to in this article. In reviewing Mr. Babbage's interesting work on the Exhibition, we had no personal knowledge of that distinguished author except that common to every cultivator of mathematical science and philosophy in England and throughout Europe; but we felt an utter detestation for the abominable manner in which he had been treated. We could not then, nor can we now, determine which has acted the most

odious part,—the spiteful and vindictive performers in the putting down system, or those members of some Governments who permitted themselves to become the working instruments of the base and malevolent, and the deadly persecutors of the most eminent of their countrymen: whoever were the members of Government that so acted, they were a thorough disgrace to Englishmen. In justification of the views which we then took, and of the *opinion* which we expressed on conduct that we deemed hateful in the extreme, we have again made comments—fairly, as we believe, on the facts and circumstances as they stand. We have endeavoured to allege reasons for the conclusions that we have drawn. We may have committed mistakes and written under erroneous impressions; if we have done so, they can easily be detected and pointed out, and the same Journal that sets them before the public will doubtless readily admit their refutation. And should the reverend accused have a defence to make to the weighty charges which now stand against him, and will send it to the *Mechanics' Magazine*, the Editor will, we hope and believe, give admission to it; and should Mr. Sheepshanks, by bringing forward his friend, who so essentially assisted in the perpetration of the offences, prove by his personal testimony that the writer of this article has done him any kind of injustice, the writer pledges himself that no one will be, more ready and willing to make the accused every reparation that he can; and for that purpose he concludes his remarks by entreating him to lose no more time in publishing his defence and producing his friend.

AN ANGLE-TRISECTOR.

BY MR. C. J. RECORDON.

The trisection of an angle is a problem which cannot be solved by rule and compass; but the instrument about to be described will accurately effect this object.

The simple geometrical principle on which it rests, is this:

Let BG be perpendicular on AE, fig. 1; we suppose triangle BCD so constructed that there shall be

$$BC=BD=DF,$$

(F being the point of intersection between CD and BG), then we shall have

$$\angle DBE=\tfrac{1}{3}\angle ABC.$$

To prove this, let the perpendiculars DH and CK fall on BG; angle BCD will be equal to BDC, because CB=BD; and angle BDH equal to HDF, because BD=DF. Moreover, we have evidently

$$\angle KCD=\angle CDH, \text{ and } \angle HDB=\angle DBE.$$

Therefore,

$$\angle ABC=\angle BCK=\angle BCD+\angle DCK=\angle BDC+\angle CDH$$
$$=\angle 2BDH+\angle BDH=3\angle BDH$$
$$=3\angle DBE$$
$$\text{or } \angle DBE=\tfrac{1}{3}\angle ABC.$$

Q. E. D.

We take now as the base of our instrument a metallic plate ABEDGC, of the form represented in fig. 2, and we lay on it a bar, HL, having a straight groove, HK, on its upper surface. At A, B, and E (which

Fig. 1.

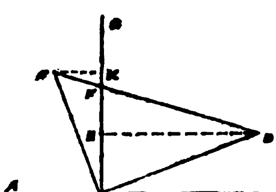
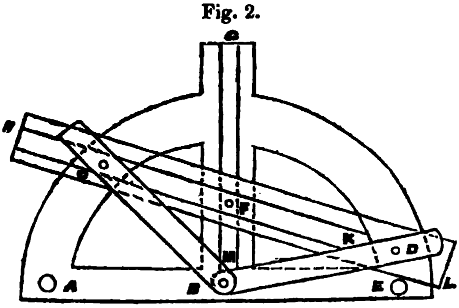


Fig. 2.



are three joints lying in a straight line) are three small cylinders fixed in the plate, and the one at B is cut on a level with HL. BC and BD, are two pieces joined like the legs of compasses, by a vertical axis at B; and at D and C are other vertical axes joining BD with HL and BC with the piece sliding with friction along HK. GM is a straight groove cut in the plate, and perpendicular to AE, and HL is joined to it in the same way as BC to HK; but the groove HK must not be stopped at F, and

the axis of the joining cylinder must move in a plane passing through B.

Now, if the distances BC, BD, DF, BA, BE of the axes at B, C, D, F, A, E, be equal, and A and E be on a level with CD, our instrument will be complete.

Angle ABC may be of any size between limits lying near 0° and 135°. The third of angles not falling within these limits, will be easily deduced from that of their complements or supplements; and, besides, it is obvious that imperfections of the instrument as to the equality of BC, BD, and DF, affect the results the least when ABC is remote from either 0° or 135°.

To apply the instrument, move BC until AC be equal to the chord of a given angle for radius BA; then DE will be the chord of one-third of this angle for the same radius.

In a succeeding Number of this Journal, we propose to describe an analogous instrument for finding the fifth part of an angle.

ON THE STRENGTH OF LOCOMOTIVE BOILERS.

To the Editor of the Mechanics' Magazine.

SIR,—In a late Number of your Journal is a letter on a very important subject, "The Strength of Locomotive Boilers," by "A.," of Rugby; the aim of which is to prove that the strength of a boiler, supported by stays, varies inversely as the cube of the distance between those stays; and two experiments recorded by Mr. Fairbairn are quoted as giving some confirmation to the theory. Now, it is a very easy thing to construct a formula that shall answer this one pair of experiments; but it is not so easy to produce one that shall prove itself accurately true to a great variety of experimental facts; nor is it so easy by one or two actual trials to prove the incorrectness of a mathematical theory which assumes the uniform existence of certain conditions that are generally very difficult to be preserved in practice. Indeed, it is as unsafe to place confidence in conclusions that may sometimes seem justified by a few experiments, as in mathematical theories drawn from abstract considerations. I think it must be pretty generally known that the experimentalist is as liable to occasional mistakes as is the theorist. I am not competent to say anything about the particular experiments alluded to; because, in the first place, I did not witness them; and, in the second, I might not have discovered their true value if I had been present, but, with your permission, I think I shall be able to show what your correspondent has overlooked, that his formula is inconsistent with *his own first principles.*

I perfectly agree with him that it is not correct to consider the strength of the boiler as entirely derived from the stay; for if the stay were the only source of strength, then the boiler would be unable to sustain any pressure without the stay, which is not generally true, I should think. But I cannot see any foundation for supposing that the pressure sustainable by the boiler over and above that due to the support of the stay, varies inversely as the distance from one to the other. Yet, if it be granted that the strength afforded by the stay varies inversely as the square of this distance, while that derived in some other way varies inversely as the first power of it, I do not think that any one can show that the whole, which is evidently the *sum* of these, varies inversely as the cube of the said distance. It appears to me that the proper formula for this would be, if p=pressure per square inch, and d the distance spoken of,

$$p=\frac{c}{d^2}+\frac{c'}{d},$$

and if p' and d' be two other corresponding values of pressure and distance, then

$$p'=\frac{c}{d'^2}+\frac{c'}{d'},$$

and

$$\frac{p'}{p}=\frac{d^2}{d'^2}\cdot\frac{c+c'd'}{c+c'd}.$$

This would seem to be the proper conclusion from "A.'s" premises, and not

$$\frac{p'}{p}=\frac{d^3}{d'^3}$$

The quantities c, c', are constants, that would have to be determined from a series of experiments. But it would further appear, that the proposition, that the strength obtained by the rigidity of the plates, viewed independently of the stays, varies with the distance between those stays, is wholly untenable. Let P be the force which the stay will support, n^2 the number of stays, and p the pressure per inch sustained independently of the stay, when $n=1$; A the area of the diaphragm in inches; then the pressure on the whole will be

$$n^2 P+Anp,$$

and the strength when there are no stays becomes nothing; and it is evident that the strength of the diaphragm cannot vanish with the number of stays except they be the only support; or

$$p=0.$$

Hence, if there be any other source of strength, it must in whole, or in part, be independent of n. I think the following

is nearer to the proper expression, though I do not believe it worthy of much confidence:

$$Q = Pn^2 + C,$$

where Q is the whole pressure, C a constant, and P and n are as before.

I am, Sir, yours, &c.,
A Mechanic.

SUBMARINE EXPLOSIVE SHELLS. —A NEW MORTAR.

To the Editor of the Mechanics' Magazine.

Sir,—My attention was first drawn to devise a means for house-defence as far back as the disastrous year of 1798, when I was only ten years of age. Two of my brothers, who were at the time at the Rev. Mr. Nelson's school in the town of Dunshaughlin, county of Meath, related to me how the insurgents, having first broken open the hall-door of the house with sledge-hammers, compelled the brave defender of his home and youthful charge to kneel on the hearth-stone of his drawing-room, and then shot him through the head with a blunderbuss, their favourite fire-arm. It would not now be so easy a matter to break open the door of a house, when *frictional* grenades, even of paper, are caused to explode on a *level* with the faces of the assailants. This grenade, when made of paper and charged with gunpowder, and a ball of Greek-fire, which burns like a flambeau for several minutes after the explosion, is the *warning-signal* thrown high into the air to prevent a coming train from running into a disabled one, as was the case in the Straffan catastrophe. In page 19 of my pamphlet on Projectiles, there is a description, with a drawing, of my manner of using the ordinary fuze hand grenades for house defence. I can cause cases or shells containing gunpowder to fall from the deck of a ship, with their fuzes ignited, when pursued by a hostile ship, at the required *instant*, or against a boarding party, so as to cripple by their explosion the pursuing or assailing. The Emperor of Russia uses an electric-battery for firing his submarine explosive-shells, something after the manner of the battery used by Sir Charles Pasley, in blowing up the wreck of the *Royal George*, at Spithead. I dispense with the battery altogether, and cause my submarine to explode by *friction*, or *percussion*, at the *instant* required. This plan I almost daily exhibit practically from on board the river and passage steamboats in Cork Harbour, to the edification and great delight of the passengers, both ladies and gentlemen.

In my daily practice with my submarine explosive shells, I have found that the resistance of the water causes the wooden float or buoy that supports the shell to be thrown by the force of the explosion to a great height into the air. This result will enable me to make experiments with both my concussion and percussion-shells, as well as my exploding sea-signals, without incurring the expense of purchasing a mortar made of gun-metal, or the care of seeking for a field that would afford a sufficient range, and where I might be allowed the use of an ordnance mortar. My submarine shell acts in a twofold manner,—first, by its explosion, which makes a breach in the bottom, or side of a ship; and, secondly, by the fall of the shot or shell, which would sink a boat of large size, where a number are covering the water in the landing of troops, as in the case of invasion.

I am, Sir, yours, &c.,
J. Norton.

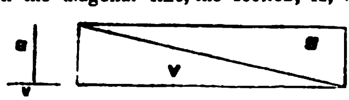
Cork, April 26, 1854.

LIPSCOMBE'S IMPROVEMENTS IN SHIP-BUILDING.

To the Editor of the Mechanics' Magazine.

Sir,—The new form of vessel proposed by Mr. Lipscombe is, I think, the same as that suggested some time since by Mr. Brown, or at least such was the impression conveyed to my mind by the descriptions given of Mr. Brown's proposition in the newspapers. I do not state this for the purpose of disputing Mr. Lipscombe's claim to originality, but simply to mention that I constructed a working model on the principle from the description I had seen of Mr. Brown's invention or suggestion, and that model was completed more than twelve months ago.

From the experience gained in the construction and working of that model, I think it may be shown that there is another form by which more cubic space is obtained, whilst the same angle of inclination is still preserved; and further, that the ordinary form given to vessels is based on this superior principle. Let us suppose figure 1 to be a solid, whose depth is one-eighth of its length, and the breadth one-fourth of the same; if the figure is divided on the diagonal line, the section, A, will



then present the wedge-form or inclined plane of Mr. Lipscombe, and the cubic contents will be one-half of the solid; but if instead of cutting off the whole of section

B, we allow a portion of it to remain attached to A, having a sharp edge formed at right angles to the sharp edge of A, better seen in fig. 2, and its sides formed to the same angle with the line of direction, it will then present no greater resistance to motion than it would do in its simple form, whilst the increase of space obtained in the above proportions of length, breadth, and thickness would be exactly one-third.

It will readily be perceived that the sharp edges of the compound wedge, as seen in fig. 2, coincide exactly with the two fundamental lines in the structure of ordinary vessels, the horizontal edge being the horizontal section of a vessel at the water-line, and the vertical edge being the vertical section of a vessel from the water-line to the keel.

The alteration of vessels from their present form to that proposed by Mr. Lipscombe would therefore simply be a retrogressive step, a giving up of the superior for the inferior; putting a crude undigested notion in the one scale against all the accumulated skill and experience of by-gone ages in the other.

It is almost superfluous to begin seriously to refute Mr. Lipscombe's assertions respecting the power of vessels drawing little water, and having no keel either to answer the rudder or to keep from drifting to leeward in a strong side wind. Indeed it is so diametrically opposed both to theory and experience that there exists neither fact nor argument to support it.

It is to be regretted that Mr. Lipscombe did not bring his ideas on the subject to the test of experiment on a small scale, and thus save himself from extensive loss and disappointment. J. M.

Aberdeen, April 24, 1854.

PROPULSION BY JETS OF WATER.

To the Editor of the Mechanics' Magazine.

Sir,—In a late number of your valued periodical, Mr. Baddeley has noticed the subject of the jet-propeller, in a manner which would lead one to suppose that he had exhausted the consideration of the question before delivering his final unfavourable verdict.

It is clear that he does not understand either the detail of the propeller employed by Ruthven, or the principles on which the propeller operates. Lifting and forcing pumps are not comparable with the propeller, inasmuch as their function is to send water through great lengths of pipe, in some cases at high velocities, whilst that of the propeller is simply to draw and force water through very short and very wide channels, and at moderate velocities. Nor does it matter, as affects the general applicability of the propeller, that there is but one velocity at which the powers of any given water-machine can be fully or economically developed; for, of course, the circumstances being known, the machine may be adapted to them. Again, the application of the jet system to the steam floating fire-engine was made in entire ignorance of the hydraulic principle involved in the application; and my only surprise is that so good results were obtained in that example. There are certain best ratios between the speed of the vessel and the effluent speed of the jets, determined by circumstances, and suitable for the obtainment of the maximum efficiency.

The subject of the jet-propeller is not so easily disposed of as Mr. Baddeley imagines; and the prolonged discussions that have lately taken place on the subject at the Institution of Civil Engineers, during which the most conflicting opinions were maintained, show, I think, that the propeller is worthy of more mature consideration than it has received from your prolific correspondent.

I am, Sir, yours, &c.,
D. K. C.

London, April 28, 1854.

CONSUMPTION OF SMOKE.

To the Editor of the Mechanics' Magazine.

Sir,—In your last number of the *Mechanics' Magazine* I have read with much interest an article headed "Consumption of Smoke." It may be both important and interesting to those who are more immediately concerned in this matter, to learn that a *smoke-consuming shaft* has been constructed, some months since, by Mr. Ezra Miles on these premises, which is perfectly successful. The plan is most simple, without any revolving bars, and a little attention to the supply of fuel is all that is required. No smoke whatever, when the stoker pays proper attention, is seen rising from the shaft, so perfect is the combustion.

I am, Sir, yours, &c.,
J. J. Lockhart.

Groux's Improved Soap Company, Haggerstone-Works, London, April 27.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Higgins, James, of Salford, Lancaster, machine-maker, and Thomas Schofield Whitworth, of the same place, mechanic.

Improvements in machinery or apparatus for spinning and doubling fibrous materials. Patent dated October 12, 1853. (No. 2347.)

The inventor's principal claims are,—1. Placing the scroll for pulling in the carriage and self-actor pulley, so as to connect them by a pinion and wheel; and also employing for that purpose the ordinary "back shaft." 2. Effecting the backing off by causing a pulley, which acts as a carrier during the spinning to become connected with a wheel upon the scroll shaft, the scroll being mounted upon the usual back shaft.

JACKSON, CHARLES SCOTT, of Cannon-street, City. *Improvements in preserving seeds, potatoes, and other roots* Patent dated October 12, 1853. (No. 2348.)

The object of this invention is to preserve seeds, potatoes, and other roots, from mildew, rot, fungus, and worms; and consists in subjecting them to, or applying to their surfaces, salts of zinc, which are, by preference, dissolved, and the roots are then steeped in the solution.

JACKSON, CHARLES SCOTT, of Cannon-street, City. *Improvements in preserving timber and other vegetable matters.* Patent dated October 12, 1853. (No. 2350.)

Claim.—The *combined* use of salts of zinc, salts of alumina, and salts of ammonia, for preserving timber and other vegetable matters from fire and decay.

JONES, RICHARD, and CHARLES JOHN JONES, both of Ipswich, Suffolk, engineers. *Improvements in fire-arms.* Patent dated October 12, 1853. (No. 2351.)

This invention consists in the arrangement of one or more series or tiers of barrels, with the axes of those forming each tier in the same plane, and the several breech ends and nipples so placed as to admit of being struck by the cock in rapid succession. The axis on which the cock turns is attached to a moveable or rocking-plate, with which it has a short range of horizontal in conjunction with the usual angular motion, so that it is allowed to escape or drop from one nipple to the next, consecutively striking all the caps in its descent.

BUTTERWORTH, HENRY WHITTAKER, of Philadelphia, Pennsylvania, United States. *An improved supplemental reflux valve for steam engines.* (A communication.) Patent dated October 13, 1853. (No. 2352.)

Claim.—"The application of a valve, or an equivalent therefor, between the cylinder of a steam engine and its boiler, in such manner as to prevent the reflux of lead steam by closing whenever the pressure of the steam in the cylinder exceeds that in the boiler, and again opening whenever the pressure is greater than that of the cylinder."

CAMPBELL, WILLIAM MUIR, of Glasgow, Lanark, North Britain, furnace-builder. *Improvements in potters' or earthenware kilns.* Patent dated October 13, 1853. (No. 2353.)

Claims.—1. "A mode of constructing kilns wherein the heated currents pass from the furnaces right and left into an annular or segmental and concentric flue, and thence into vertical flues or 'bags,' in combination with direct currents through radial flues to or towards the kiln's centre. 2. A mode of constructing kilns, wherein the heat from each individual furnace is passed direct into an annular or segmental and concentric flue, in combination with radial currents passing towards the kiln's centre."

ELCE, JOHN, of Manchester, machine maker. *Improvements in machinery for preparing and spinning cotton and other fibrous substances.* Patent dated October 13, 1853. (No. 2355.)

This invention consists, firstly, in an improved presser, applicable to the flyers of roving frames and other machines of the same nature, which presser is kept in contact with and balanced during the filling of the bobbins by the action of a weight attached to or forming part of the presser-leg. Secondly, in dispensing with the toothed sigment and pinion, forming part of the copping motion of Roberts' self-acting mules, and in connecting the sector-shaft to the faller-shaft by a link and levers. Thirdly, in an arrangement for starting simultaneously the carriage and drawing-roller of the self-acting mules.

ROBINSON, WILLIAM, of Manchester, Lancaster, screw-bolt manufacturer. *Improvements in machinery or apparatus for manufacturing or forging iron or other metals into screw-bolts, nuts, rivets, pins, studs, or other similar articles.* Patent dated October 13, 1853. (No. 2356.)

The inventor first forms the above articles in dies, by means of rapid blows, and has attached to the side of the machine a pair of shears to cut the metal to the required length, and as the articles are finished they are thrown off the machine, by means of a lever coming in contact with a cross bar, thus forming a self-acting apparatus for delivering the work.

LILLIE, SIR JOHN SCOTT, C.B., of South-street, Finsbury, London. *Improvements in machinery for breaking stones and other hard substances.* Patent dated October 13, 1853. (No. 2357.)

Claim.—"The construction of machinery for breaking stones or other hard substances into pieces of any required size, by means of stops, studs, or rails, whereby the said substances, when broken, are prevented from being reduced to powder."

WAY, JOHN THOMAS, of Holles-street,

Cavendish-square, Middlesex, professor of chemistry. *Improvements in making and refining sugar and in treating saccharine fluids.* Patent dated October 13, 1853. (No. 2358.)

Claim.—The use of soluble or gelatinous silica, or of natural earths, mineral beds, or strata and other substances, containing soluble silicia in considerable proportions, for the purpose of neutralizing an excess of lime or other alkaline earth employed in the defecation or purifying of the juices of the cane and beet root or of other saccharine liquids, and also the use of silicate of lime and the silicates of other alkaline earths for the same purposes.

Pope, Abraham, of Edgeware-road, Middlesex, engineer. *Improvements in furnaces.* Patent dated October, 13, 1853. (No. 2359.)

In this invention each furnace has two sets of fire-bars inclining towards the middle of it, and in front is a dead plate, to which the fuel is fed, and from which it is pushed on to the fire-bars. At the back end of the fire-bars there is a space for the passage of air between the bridge and their ends, and the ash pit is divided horizontally into two parts, each part of the ash pit having its door or doors to regulate the passage of air.

Meinig, Charles Ludovic Augustus, of Leadenhall-street, London. *Improvements in galvanic batteries.* Patent dated October 13, 1853. (No. 2361.)

Claims.—1. "The construction of portable galvanic or voltaic batteries, which can be placed in any position, without letting out the fluid, by fixing on a slab of gutta percha or other suitable non-conducting and non-absorbent material pairs, consisting of two dissimilar metals in metallic connection, in such a manner that cells are formed between the pairs adapted to take up a porous non-conducting substance which will absorb and retain the fluid, the pairs being placed opposite each other, so that the positive metal of one pair stands opposite the negative metal of the next pair in the same cell, but without contact, and that the fluid in one cell does not communicate with the fluid in the other cells, all as above described." 2. "An arrangement by which the fibrous non-conducting and absorbent material intended to serve as the receptacle of the fluid in batteries is fixed on a separate non-conducting substance, so as to be inserted, removed, and cleansed with facility." 3. "An arrangement of the discs and their fixing by means of sticking-plaster to the body." 4. "The use of a powder or paste, consisting of the salt, the oxyde, or the dry acid of a metal more negative than the positive metal of the battery, mixed up with starch or suitable substance containing starch, and with or without granular non-conducting matter, such as powdered glass, silica, &c. This paste to serve in the cells of batteries as a receptacle for the fluid, and a generator of electricity."

Grahame, Thomas, of Hatton-hall, Wellingborough, Northampton. *Improvements in building ships and other vessels.* Patent dated October 13, 1853. (No. 2362.)

This invention consists—1. In the substitution of several thin sheets of metal in place of single sheets of a greater thickness, such thinner sheets to be laid together, and have between them layers or sheets of cork, gutta percha, India-rubber, cloth, paper, or other such material, to exclude the action of the atmosphere, and to offer a series of elastic flexible fillings between the several sheets of metal. The invention consists—2. In the substitution of ribs or framings of trough-iron, in place of the angle or T-iron now in use in iron, wooden, or other vessels, in the view of obtaining greater strength with diminished weight. And it consists—3. In covering the bottoms of vessels, whether built of wood or iron, with a smooth vitreous substance, or smooth enamel of any kind, to reduce the friction in passing through the water.

M'Lean, Andrew, of Edinburgh, Midlothian, North Britain, chemist, and William Fraser Rae, of the same place, brass-founder. *Improvements in apparatus for the manufacture of aërated liquids.* Patent dated October 14, 1853. (No. 2366.)

Claims.—1. The mode of constructing apparatus for the manufacture of aërated liquids, wherein the various details or parts are carried upon a portable base, with the water-vessel, gasometer, generator, and condenser arranged thereon as described. 2. The mode of constructing the water-receiver and gas-holder with a bottom common to both. 3. The peculiar mode of corking bottles, as described.

Davy, Mary Ann, of Homerton, and Ann Taylor, of Islington, Middlesex. *Improvements in the mechanical application of brushes.* Patent dated October 14, 1853. (No. 2368.)

These improvements relate to giving a rotatory, horizontal, vertical, or inclined motion, in any required direction, to brushes of different forms and sizes to be employed in operating flesh brushes, and for lessening the labour of other operations usually performed by hand.

Palmer, William, of Brighton, Sussex, ironmonger. *Certain improvements in ventilating.* Patent dated October 14, 1853. (No. 2369.)

The inventor describes a method of constructing the frames of window sashes, with boxes or chambers in the heads or upper

parts thereof, and mortices in the sides of the same, for the reception of telescopic or other ventilators; and several methods of constructing ventilators.

NEWTON, WILLIAM EDWARD, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for preparing and combing wool.* (A communication.) Patent dated October 14, 1853. (No. 2370.)

The patentee claims certain means for consolidating or compressing the sliver, and the use of a card segment and a comb-semi-cylinder; also certain arrangements for feeding forward the sliver.

CADOGAN, THE HON. FREDERICK WILLIAM, of Hertford-street, May-fair, Middlesex. *Improvements in the means of obtaining telegraphic communications, applicable to armies in the field.* Patent dated October 14, 1853. (No. 2372.)

The inventor employs a carriage divided into two compartments, one of which is fitted with shelves and recesses to contain batteries and apparatus suitable for obtaining electric currents, and the other being fitted with a table, on which the electric telegraphic apparatus or instrument is fixed; there are also seats for the persons communicating or receiving information. The upper part of this compartment may be arranged to open in its centre and fall back on either side. Rollers, having insulated wire wound on them, are mounted on brackets or bearings in or outside of the carriage, and to one end of the axle of the roller a small cog-wheel is fixed for turning it. The insulated wire is taken in or run off the barrel according to the direction in which the latter is turned. There is attached to the carriage a Manby's mortar, or other suitable apparatus for throwing an insulated wire across a river or other inland water.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, Holborn, London. *Improvements in drying grain, flour, timber, fruit, vegetables and other substances.* (A communication.) Patent dated October 14, 1853. (No. 2373.)

Claim.— The method of drying grain, flour, meal, timber, fruit, vegetables, and other substances, by surrounding them with steam, which is generated and superheated in a vessel in which it is not confined to produce pressure; whether the said materials and substances are placed in direct contact with the steam itself, or are conveyed through pipes or conductors which are wholly or in part surrounded by the steam.

COATES, CHARLES, of Sunnyside, near Rawtenstall, Lancaster, mechanic. *Improvements in and applicable to looms for weaving.* Patent dated October 15, 1853. (No. 2375.)

This invention consists, firstly, in a combination of parts whereby the motions of a loom can be suddenly checked and stopped when the weft fails, or when the shuttle fails to enter the shuttle-box, by disconnecting a pair of friction wheels or pulleys by which the loom is driven, and by the application of a break; and it consists, secondly, in constructing shuttles so that the retaining spring, by which the cop is held on the skewer, is only brought into action when the cop is on the skewer, remaining inactive when the cop is put on.

THOMAS FREDERICK SAMSON, of Cornhill, London, gentleman. *Improvements in the construction of railway carriages.* Patent dated October 15, 1853. (No. 2376.)

This invention consists,—Firstly, in constructing compressible railway and other carriages. Secondly, in the employment of a suspended buffer. Thirdly, in the application to railway carriages of axles revolving at their centres. Fourthly, in the employment of a girale in the event of collisions. Fifthly, in the employment of a railway tender, the frame of which is made of compressible and expansive tubes. And, sixthly, in the employment of a travelling buffer.

PRICE, BENJAMIN, of Fieldgate-street, Whitechapel, Middlesex, furnace-builder. *Certain improvements in the means of or apparatus for reducing the quantity of smoke from the furnaces of boilers, coppers, pans, and other like vessels.* Patent dated October 15, 1853. (No. 2377.)

The inventor proposes to use air-tubes, which are subjected to the heat of the fire for the purpose of heating the air, which is afterwards admitted to one or more of the chambers described in the specification of a former patent of the inventor's, the object being to get a greater supply of heated air to those chambers.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the manufacture of iron.* (A communication.) Patent dated October 15, 1853. (No. 2378.)

This invention consists in the formation and arrangement of a series of deoxydising tables, which may be either horizontal or inclined, and perforated or not, upon which tables the iron ore, after having been pulverised by being first roasted and afterwards pounded fine, and of an even grain, is placed. The ore is then directly exposed to the heat of the waste gases from the flourishing hearth, as well as to additional heat from furnaces placed under these tables.

ROYLE, BUCKLEY, of Manchester, Lancaster, manufacturer, and WILLIAM MAC EWAN CHELL, of the same city, salesman. *A certain method of treating silk-waste,*

arising from winding, warping, and weaving silk, and rendering it capable of being spun, or otherwise employed. Patent dated October 15, 1853. (No. 2379.)

Claim.—The reducing or preparing of the fibre of silk waste, by cutting it up into sufficiently short lengths to suit the purpose required, in order to bring the said fibre into such a state as to admit of its being prepared and spun, or otherwise employed in a similar manner.

MAC DOUGALL, ALEXANDER, of Manchester, Lancaster, manufacturing chemist. *Improvements in the process of obtaining fatty matters from products arising in the manufacture of glue and other gelatinous substances.* Patent dated October 15, 1853. (No. 2384.)

This invention, which is an improvement upon that patented by the inventor, June 14, 1853, consists in using chlorine instead of the acid, or in combining it with it, for the purpose of avoiding the foul odours arising from the decomposition of animal matter, and from acid vapours.

LAURIE, GEORGE, of New York, United States, dentist. *Improvements in the manufacture of artificial teeth and gums.* (A communication.) Patent dated October 15, 1853. (No. 2386.)

This invention consists—1. In using asbestos in combination with sand and plaster of Paris, in place of plaster of Paris and sand alone, when covering the teeth, after they have been set in wax on a metal plate. And, 2. In forming the gums or parts of gums of a vitreous compound in combination with the use of a metal plate, with teeth affixed thereto.

APPLEGATH, AUGUSTUS, of Dartford, Kent, printer. *Improvements in printing and embossing paper, with a view to prevent forgery.* Patent dated October 15, 1853. (No. 2387.)

This invention consists in causing several colours to be applied by an engraved surface, simultaneously, in pattern and in register, on the whole or part of the surface of the paper used for receiving the writing or printing of documents.

CHANTRELL, GEORGE FREDERICK, of Liverpool, Lancaster, furnace engineer. *Improved apparatus applicable to the manufacturing and the revivification of animal or vegetable charcoal, and other useful purposes.* Patent dated October 17, 1853. (No. 2388.)

Claims.—1. The construction of apparatus for manufacturing or reburning animal charcoal, whereby it is kept free from contact with iron until all humid matter is extracted from the char. 2. A peculiar backward and forward draught, as described. 3. The method described of jointing and forming the pier-blocks or lumps, and the tiles used to form the retort chambers.

DUNLOP, JOHN MACMILLAN, of Manchester, Lancaster, engineer. *Improvements in machinery or apparatus for pressing goods, applicable also to raising or removing bodies.* Patent dated October 17, 1853. (No. 2390.)

The inventor claims the use of apparatus in which the nut and screw are caused to revolve at different velocities, and also combined therewith, the use of apparatus for effecting at pleasure the revolution of one of them only, such apparatus being applied to pressing bodies and to screw-jacks; and he also claims a double press, the followers of which are actuated from opposite ends of a screw or screws.

PASS, CAPPER, of Bedminster, Somerset, metal refiner. *Improvements in the manufacture and refining of copper.* Patent dated October 17, 1853. (No. 2392.)

Claim.—The employment of blast furnaces and the hot blast in the manufacture and refining of copper.

JONES, ELLEN, of Palace-street, Pimlico, widow and administratrix. *Improvements in steam-engine governors.* Patent dated October 17, 1853. (No. 2393.)

This invention consists of applying springs acting on a piston in a cylinder, to prevent the prejudicial effect of any sudden action of a governor, by receiving the first effort of any sudden action, and tending to neutralize it.

LISTER, SAMUEL CUNLIFFE, of Bradford, York. *Improvements in combing cotton and wool.* Patent dated October 17, 1853. (No. 2394.)

This invention consists of improvements in arranging machinery for cotton and short stapled fibre. And the first improvement is the arranging filling heads, or apparatus for filling Surat and cotton of short staple into combs, so as to work with rollers of less diameter than an inch and a half.

FONS, JOHN PALMER DE LA, of Carlton-hill, St. John's-wood, Middlesex, gentleman. *Improvements in apparatus for measuring and indicating the distance travelled by a carriage.* Patent dated October 17, 1853. (No. 2395.)

In this invention there is an eccentric fixed on the nave of one of the wheels, which gives motion to a connecting-rod in two parts, the one sliding within the other; the upper end moves on a pin joint, so that the play of the springs is compensated for. The connecting-rod, by a suitable driver, acts on a ratchet-wheel and moves it a certain distance; each revolution of the eccentric on the wheel of the carriage, and the axle of the ratchet-wheel gives motion by a pinion to a cog-wheel on another axle, on which again is a ratchet that gives motion to a scale.

Applegath, Augustus, of Dartford, Kent, printer. *Improvements in letter-press printing machinery.* Patent dated October 17, 1853. (No. 2396.)

This invention consists in arranging machinery in such manner that three "forms" are used, two of which are similar, for printing one side, and the other for printing the other side, so that two impressions are taken by the machine from one of the "forms" for each impression taken from either of the other forms.

Stocks, George Lewis, of Limehouse-hole, Poplar, Middlesex, ship-chandler. *Improvements in ships' jackstays for masts and gaffs for fore and aft sails.* Patent dated October 18, 1853. (No. 2399.)

This invention consists in the manufacture and use of metal fastenings or hanks, in place of the hoops or jackstays now employed, to attach fore and aft sails to the masts and gaffs of ships, and to enable them to slide thereon.

Noel, Alphonse Doste, of Chancery-lane, French advocate. *Improvements in the manufacture of zinc white.* (A communication.) Patent dated October 18, 1853. (No. 2401.)

In this invention a fire-place is formed at the lowest part of the building; the heat and products of combustion pass into an upper chamber by suitable openings, and thence through a second chamber to the chimney. Retorts are set in each of the chambers, and the ends of the latter are bricked up, leaving a moveable brick opposite each retort, to admit of the introduction of the zinc through the opening. The retorts, by suitable pipes, communicate with a compartment which is built at the sides of the retort-stack. The products of zinc pass into this compartment and meet with sulphurous acid vapours, conducted to them by a suitable pipe or pipes from burning sulphur, and are thus converted into superior zinc white; or air may be introduced into the compartment.

Nicholson, Cornelius, of New Broad-street, Middlesex, Esq., superintending director of the Great Indian Peninsular Railway Company. *An apparatus for avoiding collisions of trains on railways.* Patent dated October 17, 1853. (No. 2403.)

Claim.—The mode of conveying danger-signals to persons in charge of a train by means of a series of safety-posts with adjustable or moveable arms, such arms acting upon an alarm-apparatus attached to a portion of the train.

Rider, Emory, of Coleman-street, London, manufacturer. *Improvements in the manufacture or treatment of gutta percha, being improvements upon the invention secured to him by letters patent, dated the 20th day of July,* 1852. (Partly a communication.) Patent dated October 18, 1853. (No. 2404.)

Claim.—The mode of treating gutta percha by the addition thereto of a very small quantity of sulphur, or an equivalent thereof, prior to the exposure of the same to the action of heat, for the purpose of expelling the volatizable ingredients therefrom, as secured to me by a former grant of letters patent.

Child, John Wright, of Halifax, York, and Robert Wilson, of Low Moor Ironworks, in the same county, engineers. *Improvements in regulating motive-power engines.* Patent dated October 19, 1853. (No. 2048.)

When this invention is used in connection with the ordinary pendulum governor, instead of connecting the governor directly to the throttle, or regulating, or expansion-valve of the engine, the sliding-ring or other adjusting detail of the governor is connected in the first place to an intermediate link passing to the valve of a small detached cylinder, such cylinder being made and fitted with a piston, just like a miniature steam engine, and the valve so connected with the governor is made to communicate with both ends of the cylinder by upper and lower ports in the usual manner.

Norton, John, of Cork, Ireland, esquire. *Improvements in fire-arms.* Patent dated October 19, 1853. (No. 2409.)

Claims.—The mode of manufacturing or producing rifled fire-arms by casting the rifled grooves or channels therein. 2. The manufacture of rifled fire-arms by the operation of moulding and casting. 3. The mode of producing rifled core-boxes by rifling the sections or division-pieces of such boxes in a state of combination. 4. The application and use in the manufacture of fire-arms of rifled cores.

Roy, William, senior, of Cross Arthurlie, Renfrew, North Britain, calico-printer. *Improvements in printing textile fabrics and other surfaces.* Patent dated October 19, 1853. (No. 2410.)

Claims.—1. The use in machinery for printing on textile fabrics and other surfaces of printing carriages made to traverse over the matérial to be printed, and of which the several printing movements are actuated by a rack fixed to a stationary, overhanging, or other framing. 2. A mode of causing the printing-roller to draw in the elastic slack of the fabric by giving the roller a surface velocity, slightly greater than that due to its actual traverse.

Shaw, Robert, of Glasgow, Lanark, North Britain, calico-printer. *Improvements in writing-instruments.* Patent dated October 19, 1853. (No. 2411.)

Claims.—1. A mode of causing or securing a uniform flow of ink in pens or writing-

instruments by the use of conductors disposed within the barrels of such instruments. 2. The use of capillary spaces in the barrels or tubular portions of pens and writing-instruments, for the purpose of securing an uniform flow of ink.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

POPPLE, ROBERT, of Beverley, York, colour manufacturer, and HENRY WOODHEAD, of Kingston-upon-Hull, cotton-spinner. *Improvements in machinery for slubbing, roving, and spinning cotton and other fibrous substances.* Application dated October 13, 1853. (No. 2354.)

This invention consists in the application of a second set of rollers to machines for roving, slubbing, and spinning cotton or other fibrous substance in such manner that the three processes are effected by one machine.

PIPER, JOSEPH, of Shoreditch, Middlesex, furnishing ironmonger. *Improvements in apparatus for fixing adhesive stamps and labels.* Application dated October 13, 1853. (No. 2360.)

In this invention a lever apparatus is caused to vibrate on its upright axis, one end of the lever passing under a hollow trunk or holder, in which the labels are contained, and moving the lower one of them into position to be moistened by a roller or other instrument on its adhesive side, the other end of the lever coming to the stamp or label thus moved, bringing with it nippers which take hold of the label and pressers which press upon it.

JONES, WILLIAM, of Porchester-street, Hyde Park-square, Middlesex, gentleman. *A certain chemical compound or compounds applicable as a remedy for cuts, scalds, burns, wounds, and accidents of a similar nature, to which the same can or may be applied.* Application dated October 14, 1853. (No. 2364.)

The inventor mixes and pounds bol Armenia, blue vitriol, rock alum, and white copperas, and then forms a paste or liquid of this compound mixed with acetic acid, and applies it on rag in the usual way.

BROMHEAD, SAMUEL, of Marlborough Estate, Peckham, Surrey. *Improvements in emigrants' and other portable houses and erections, and hinges of metal suitable to all purposes requiring hinges.* Application dated October 14, 1853. (No. 2365.)

This invention mainly consists in certain metal fastenings to be used for connecting the various parts of portable houses.

RIDGWAY, WILLIAM, of Hanley, Stafford, earthenware manufacturer. *Improvements in the construction of ovens and kilns.* Application dated October 14, 1853. (No. 2367.)

This invention consists in applying to ovens and kilns for firing earthenware, &c., of a system of short pipes or tubes, which are arranged at suitable distances over the bottom of the oven or kiln, and communicate with the flues underneath.

FARRELL, JOHN, of Stangate, Surrey. *Improved means of insulating wire.* Application dated October 14, 1853. (No. 2371.)

This invention consists of applying a composition consisting of tar and powdered charcoal, in place of, or in addition to the insulating materials now used for coating wire.

GILL, RICHARD, of Culcheth, near Leigh, Lancaster, manufacturer. *Improvements in weaving single and double fabrics.* Application dated October 15, 1853. (No. 2374.)

These improvements are chiefly applicable to weaving double coutelle, or other fabrics, in which it is desirable to produce an even surface, free from lint or loose fibre. In order to effect this, the inventor causes the reed to strike twice against the cloth for each stroke of weft.

WOODCOCK, THOMAS, of Barnsbury-road, Middlesex, carver. *Improved means of cutting, carving, engraving, piercing, or embossing metallic or other surfaces.* Application dated October 15, 1853. (No. 2382.)

This invention relates to a plan of withdrawing the tool from the work when any portion of the surface is to be left plain, while other parts are to be cut away by means of a powerful electro-magnet in combination with a pattern or design.

PEARY, JOHN, of Salisbury-crescent, Middlesex, smith. *Improved means of preventing accidents on railways.* Application dated October 15, 1853. (No. 2383.)

This invention consists in an arrangement of mechanism composed mainly of weighted levers or springs, to be connected at one end with either a visible or an audible signal, and at the other end with mechanism, that an approaching train may act upon, and thereby give warning of its approach.

ROY, WILLIAM, Sen., of Cross Arthurlie, Renfrew, calico-printer. *Improvements in the preparation or thickening of colouring matters for printing.* Application dated October 17, 1853. (No. 2389.)

This invention relates to the use of carrageen, or Irish moss, for thickening and preparing the colours used by printers of calicoes and other goods.

LOW, WILLIAM SCOWCROFT, and JOHN BARNES, both of Rawtenstall, Lancaster, weavers. *An improved shuttle to be used in looms for weaving.* Application dated October 17, 1853. (No. 2391.)

This invention consists in constructing shuttles with a hinged piece of metal or finger, which is acted upon by a spring, the use of the said finger being to cut the weft-thread when the shed of the warp-threads is

intercepted by anything, so that all floated cloth will be prevented, &c.

HAITE, JOHN JAMES, and WILLIAM LEACH, both of New Coventry-street, London, musical instrument-makers. *Improvements in the pistons of certain valved wind instruments.* (A communication.) Application dated October 17, 1853. (No. 2397.)

This invention consists in certain modifications in the construction of the pistons of valved instruments, by which the valve and open notes may be perfectly assimilated.

PRICE, GEORGE, of Wolverhampton, Stafford, auctioneer. *A new or improved method of communicating between the guard and driver of a railway train.* Application dated October 18, 1853. (No. 2398.)

This invention consists of an elastic continuous tube of any required length coiled round a hollow drum, inclosed in a case fixed in the guard's van.

D'AZENE, CHARLES PEYRAUD, of Essex-street, Strand, Middlesex, gentleman. *Improvements in the method of rendering sea-water fit for drinking, and all purposes where fresh water is ordinarily used.* Application dated October 18, 1853. (No. 2400.)

This invention consists in filtering sea-water through a filter prepared for its reception by the use of a chemical mixture composed of animal charcoal, tallow, lime, sulphate of iron, sulphuric acid, and fresh water, which are mixed together in the following proportions: — Animal charcoal, 3 parts; tallow, 3 parts; lime, 8 parts; sulphate of iron, 4 parts; sulphuric acid, 3 parts; fresh water, 16 parts. The filter is to be generally composed of two inner stones, so as to secure a double filtration, but the ordinary filter may be used.

JOHNSON, JOHN HENRY, of Lincoln's Inn-fields, Middlesex, gentleman. *Improvements in raising or supporting heavy bodies for the better preservation of life and property.* (A communication.) Application dated October 18, 1853. (No. 2402.)

This invention consists in the employment of gas generated rapidly in suitable vessels in place of atmospheric air ordinarily used for inflation.

HARTAS, ISAAC, of Wrelton-hall, York, farmer. *Improvements in machinery for cutting turnips and other roots.* Application dated October 18, 1853. (No. 2405.)

This invention consists in forming a machine with a barrel in three parts, put together and adapted to a central shaft or axle, and provided with three long slits or openings, which are covered by the longitudinal knives or cutting instruments, leaving beneath them space sufficient for the slices of the root to pass through to the interior of the cylinder, from whence they fall out into any suitable receptacle.

GIDLEY, GUSTAVUS, of Robert-street, Hoxton, Middlesex, and JOHN BELL MUSCHAMP, of Claremont-house, Kensington, same county. *An improvement in making India-rubber solution for waterproofing cloth or other articles without the offensive smell produced by the use of naphtha, turpentine, oils, &c.* Application dated October 19, 1853. (No. 2406.)

The main feature of this invention consists in partly setting fire to a quantity of India-rubber placed in a vessel formed of woven iron or other wire, the oil or fatty matters being caused to exude through the meshes into a receiver.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *An improved composition to be applied in substitution of bone and horn.* (A communication.) Application dated October 19, 1853. (No. 2407.)

This invention consists in producing a composition of vegetable or animal matters mixed with gelatinous and resinous substances, rendered impervious to water by means of tannin, and also impervious to fatty bodies by means of gums.

PROVISIONAL PROTECTIONS.

Dated January 25, 1854.

187. John Petrie, jun., of Rochdale, Lancaster. Certain improvements in apparatus for drying wool after it has undergone the process of washing or scouring.

Dated February 10, 1854.

322. William Bray, of Swan-lane, London, agricultural-implement maker. Improvements in the construction of portable farm and other buildings, part of which improvements are applicable to the construction of cart and wagon bodies and other structures.

Dated March 1, 1854.

499. John Baptiste Gottung, of Hawley-place, Kentish-town, Middlesex, baker. Embroidering on leather for harness and other purposes. A communication.

Dated March 15, 1854.

616. Peter Armand Lecomte de Fontainemoreau, of South-street, London. Improvements in heating-apparatus. A communication.

Dated March 20, 1854.

655. Edward Esnouf and Charles Mauger, jun., both of Jersey, and George Washington Lewis, also of Jersey, carpenter. Improvements in portable dwellings and vehicles for travellers or emigrants.

Dated April 6, 1854.

789. James Smith, of St. Leonard's-on-Sea, Sussex, contractor. Improvements in the construction of railways.

791. Charles de Bergue, of Dowgate-hill, London, engineer. Apparatus for acting on water and other liquid, so as to force, displace, or propel the same, or a body floating thereon.

793. Simon O'Regan, of Liverpool, Lancaster, engineer. Improvements in engine-boiler furnaces and other furnaces.

797. John Yule, of Port Dundas-road, Glasgow. Improvements in the machinery for raising minerals from mines.

799. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in the construction of hot-air engines. A communication.

801. James Worrall, junior, of Salford, Lancaster, dyer and finisher. Certain improvements in the method of bleaching fustians and other textile fabrics, and in the machinery or apparatus connected therewith.

Dated April 8, 1854.

826. Thomas Bromley, of Liverpool, Lancaster, soap-boiler. Improvements in the manufacture of soap.

830. William Williams, of Park-cottage, Ebbw Vale, and Thomas Evan Williams, of Abersychan Ironworks, near Pontypool, Monmouth. Improvements in reverberatory furnaces.

832. William Crofton Moat, of the Strand, Westminster, surgeon. A machine for crushing, pulverising, and amalgamating.

834. Henry Gilbee, of South-street, London. Improvements in the construction of axle-boxes and axle-bearings. A communication.

Dated April 10, 1854.

836. William Wood, of Monkhill-house, Pontefract, York. Improvements in treating animal matters and refuse.

837. William Wood, of Monkhill-house, Pontefract, York. Improvements in apparatus employed in the manufacture of cut pile fabrics.

838. Alfred Sohier Bolton, of Birmingham, Warwick, manufacturer, and Francis Seddon Bolton, of Birmingham, manufacturer. An improvement or improvements in the construction of steam boilers.

839. Alfred Sohier Bolton, of Birmingham, Warwick, manufacturer, and Francis Seddon Bolton, of Birmingham, manufacturer. A new or improved method of manufacturing certain kinds of metallic tubes.

840. Felix Lieven Bauwens, of Pimlico, Middlesex, chemist. Improvements in distilling fatty bodies, and in stills or apparatus for such distillation.

841. William Lewis Baker, of Hargrave, Northampton, civil engineer. Improvements in clock, tower, turret, and other like bells.

Dated April 11, 1854.

842. Richard Archibald Brooman, of 166, Fleet-street, London, patent-agent. Improvements in the manufacture of hats. A communication.

843. Zachariah Round, of Dudley, Worcester, plasterer. An improvement or improvements in bricks to be used in certain parts of buildings.

844. William Elliott Brooks, of Queen-street Middlesex, frame-maker. Improvements in valves for atmospheric railway tubes.

845. Edward Lavender, of Princes-road, Bermondsey. Improvements in apparatus for stirring and acting on matters subjected to heat in retorts.

847. Charles Anthony Noedl, of Upper St. Martin's-lane, Middlesex. A portable vapour bath.

848. John Mitchell, of the Assay-office, Dunning's-alley, Bishopsgate-street, London, assayer. Improvements in machinery for pulverising, grinding, amalgamating, and washing ores.

849. John Johnson Peile, of Whitehaven, Cumberland, iron-merchant. An improved construction of lifting-jack.

851. Uriah Scott, of Camden-town, Middlesex, engineer. Improvements in the adaptation of elastic material to boots and shoes, and shoes for horses and other animals.

852. John Miller the younger, of Liverpool, Lancaster, shipbuilder, and Michael Burke, of Liverpool, cabinet-maker. Improvements in machinery for transmitting motive power.

853. Thomas Carr, of Liverpool, Lancaster, sharebroker. Improvements in steering apparatus.

854. Benjamin Fothergill, engineer and machinist, and William Weild, engineer, both of Manchester, Lancaster. Improvements in machinery for combing cotton, wool, flax, silk, and other fibrous materials.

855. William Henry James, of Camberwell, Surrey, civil engineer. Improvements in marine and other structures.

Dated April 12, 1854.

856. Lewis Cruger, of Washington, United States of America. A new and improved mode of attaching propellers to ships and vessels of all classes. A communication.

857. Edward Briggs, of the Castleton Mills, near Rochdale, Lancaster, manufacturer. Improvements in machinery and apparatus for finishing yarn and thread.

858. Robert Whiteside, of Egremont, Birkenhead. Improvements in treating or purifying wheat and other grain.

859. William Coltman, of High-street, Leicester. An improvement in knitting-frames.

860. Joseph Piper, of Shoreditch, Middlesex, furnishing ironmonger. Improvements in apparatus for affixing adhesive stamps and labels.

861. Samuel Colt, of Spring-gardens, Middlesex, gentleman. Improved machinery for cutting or shaping metals. Partly a communication.

862. George Letts, of Northampton, mechanic. An improved mole-trap.

Dated April 13, 1854.

863. Samuel Brewster Parker, of Deptford, Kent, chemist. An improved apparatus for consuming smoke.

864. Emile William Hansen, of Saxe Gotha, engineer. An electro-magnetic engraving machine.

865. George Elliot, of St. Helen's, Lancaster, manufacturing chemist. Improvements in the manufacture of carbonate of soda.

866. Arthur Hawker Cox, of Ship-street, Brighton, Sussex, chemist and druggist. Improvements in coating pills and boluses.

867. John Greenwood, of Irwell Springs, near Bacup, Lancaster, Turkey-red dyer, and Robert Smith, of Bacup, manufacturer. Certain improvements in sizeing, stiffening, and finishing textile materials or fabrics.

868. Giuseppe Devincenzi, of Grosvenor-street, Middlesex, gentleman. A method or methods of producing engraved, figured, and typographic surfaces for printing and embossing from and for ornaments, also certain machinery employed therein.

Dated April 15, 1854.

869. James Griffiths, of Moorgate-street, London, gentleman. An improved portable measuring instrument.

871. Henry Meyer, of Manchester, engineer. Improvements in looms for weaving.

872. Joseph Croisy, of Paris, France, mechanician. Improvements in machinery for manufacturing bolts, rivets, screw-blanks, railway pins, and other similar articles.

873. Thomas Lawes, of City-road, Middlesex. Improvements in protectors for the head. A communication.

875. Alexander Chaplin, of Glasgow, Lanark, engineer. Improvements in the application of cast iron to building purposes.

876. Peter Armand Lecomte de Fontainemoreau, of London. Improvements in priming fire-arms. A communication.

877. Frederic Barnett, of Caroline-street, Bedford-square, Middlesex, gentleman. Illuminated furniture, &c., for interior and exterior decoration.

878. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in the manufacture of steel and wrought iron directly from the ore. A communication.

879. George Louis Felix Tiret, of Paris, France. An improved canvas for embroidering.

Dated April 17, 1854.

880. George Heyes, of Aspull, near Wigan, Lancaster, manufacturer. Improvements in the method of arranging and constructing the gearing or driving-apparatus of machinery, to prevent accidents, and save time and expense in arranging the same.

881. Thomas Hawkins, LL.D., of Northfleet, Kent. An apparatus for creating an upward draught or current of air in chimnies, which apparatus is also applicable to the purposes of ventilation.

882. William Wilkinson, of Nottingham, frame-work-knitter. Improvements in the method of and machinery for manufacturing ropes and cords.

883. William Henry Bentley, of Bedford, engineer. Improvements in cannons, guns, and other fire-arms, and in projectiles for the same.

884. Benjamin Fullwood, of Bermondsey, Surrey, manufacturing chemist. Improvements in the manufacture of cement

885. James Alexander Smith, of Edinburgh, Mid Lothian, gentleman. Improvements in the manufacture of explosive projectiles.

886. David Tannahill, of Glasgow, Lanark, engineer. Improvements in lithographic and zincographic printing.

Dated April 18, 1854.

887. Charles Chapel Davis, of Bath, Somerset, gas-engineer. Improvements in portable blow-pipe apparatus.

889. Charles Meason, of Warrington, Lancaster, engineer. Improvements in supplying fuel and water to locomotive engines, or to the tenders of locomotive engines.

893. Charles Watt, of Gloucester-gardens, Gloucester-place, Kentish-town, practical chemist. Improvements in bleaching hemp, flax, and other fibrous substances.

895. John Frearson, of Smethwick, mechanical engineer. Improvements in steam engines.

897. Jean François Felix Challeton, of Brughat, France. Certain machinery for purifying and condensing peat, and also for conveying it.

Errata.—No. 1597, p. 261, *for* Feb. 25, read Feb. 24. Same No., p. 262, *before* No. 458, *insert* "Dated Feb. 25, 1854."

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May 2nd,* 1854.)

2781. Joshua Jackson. A new or improved signalling apparatus.

2785. John Hewitt. Certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.

2853. James Beall. Improvements in apparatus for applying sand to the rails of railways.

2866. James Sutcliffe. Improvements in steam engines, and in apparatus connected therewith.

2869. John Henry Johnson. Improvements in portable cases for containing provisions. A communication from Alexandre Desiré Eugene Boucher, of Paris, France, merchant.

2943. Isaac James. Improvements in carts for distributing water or liquid manure.

3018. James White. Improvements in friction-joints or fastenings.

161. Matthew Andrew Muir. Improvements in weaving.

169. Jean Marie Julien Louis Bouvet. Certain improvements in kneading-machines.

185. Edward Batten Walmsley. Improvements in utensils, implements, and apparatus for the purposes of lighting, heating, and cooking.

229. Robert Chapman. An apparatus for regulating the feed to mill-stones.

322. William Dray. Improvements in the construction of portable farm and other buildings, part of which improvements are applicable to the construction of cart and wagon bodies and other structures.

499. John Baptiste Gottung. Embroidering on leather for harness, and other purposes. A communication.

515. William Brown. An improved mode of obtaining volatile products from bituminous coals and other bituminous substances.

567. William Young. Improvements in lamps.

586. John Patterson. Improvements in machines for washing cloth and similar materials.

636. William Holt. Improvements in reed pipes for organs.

755. William Kestell. An improvement in fixing or cementing glass to metal.

772. Robert Brisco and Peter Swires Horsman. Certain improvements in heckling machinery.

784. Jonathan Harlow. Improvements in the manufacture of metal bedsteads.

789. James Smith. Improvements in the construction of railways.

799. Alfred Vincent Newton. Improvements in the construction of hot-air engines. A communication.

802. John Henry Johnson. A revolving, blowing, and ventilating water-extractor, for drying cloth. A communication from T. F. King, of New York, United States of America.

812. William Henry Bentley. Improvements in irrigators or machines for watering grass and other lands, roads, floors, flowers, plants, shrubs, and trees, and applicable for all purposes for which ordinary watering pots are employed, parts of which improvements are also applicable to pumps for raising and forcing liquids.

818. John Henry Johnson. An alkaline steam washing apparatus. A communication from T. F. King, of New York, United States of America.]

822. William Edward Newton. Improvements in producing stereoscopic pictures, and in the apparatus for exhibiting such or similar pictures. A communication.

829. William Worby. Improvements in machinery or apparatus for separating grain from straws, broken off ears, husks, and other refuse, after being thrashed.

830. William Williams and Thomas Evan Williams. Improvements in reverberatory furnaces.

836. William Wood. Improvements in treating animal matters and refuse.

837. William Wood. Improvements in apparatus employed in the manufacture of cut pile fabrics.

842. Richard Archibald Brooman. Improvements in the manufacture of hats. A communication.

848. John Mitchell. Improvements in machinery for pulverizing, grinding, amalgamating, and washing ores.

851. Uriah Scott. Improvements in the adaptation of elastic material to boots and shoes, and shoes for horses and other animals.

855. William Henry James. Improvements in marine and other structures.

861. Samuel Colt. Improved machinery for cutting or shaping metals. Partly a communication.

863. Samuel Brewster Parker. An improved apparatus for consuming smoke.

864. Emile William Hansen. An electro-magnetic engraving machine.

878. Auguste Edouard Loradoux Bellford. Certain improvements in the manufacture of steel and wrought iron directly from the ore. A communication.

883. William Henry Bentley. Improvements in cannons, guns, and other fire-arms, and in projectiles for the same.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed April 28, 1854.

2495. Malcolm Maclaren.
2503. Richard Archibald Brooman.
2507. John Turner Wright, Edwin Payton Wright, and Wm. Asbury.
2509. Edward Gregson Banner.
2511. Felix Paulin Rovère.
2516. John Brown.
2517. Damiano Assanti.
2522. Samuel Lomas.
2536. Edwin Dalton Smith.
2543. Henry Brierly.
2571. Samuel Harrison.
2573. Charles Carr and William Kyle Horsley.
2576. James Barlow and Thomas Settle.
2581. Marino Louis Joseph Christophe Vincent Falconi.
2595. George Shepherd.
2641. Charles De Bergue.
2664. Solomon Abraham and Samuel Victor Abraham.
2836. John Henry Johnson.
2891. William Frederick Plummer.
2980. James Gibbons the younger.
2992. Gustav Adolph Buchholz.

1854.
281. Robert Stirling Newall.
312. Peter Armand Lecomte de Fontainemoreau.
328. Henry Warner, Joseph Haywood, and William Cross.
353. Thomas Bury, Walter Glover, Jas. William Speed, and John Hardman.
356. Charles Augustus Holm.
365. Benjamin Hornbuckle Hine, Anthony John Mundella, and William Onion.
414. Robert Walker.
415. James Boydell.
429. Samuel Colt.
444. Samuel Little Hardy.
464. Charles Lamport.
465. James Boydell.
473. Charles de Bussy.
485. André Louis Mallet.
496. Charles Hargrove.
534. John Warhurst.

Sealed April 29, 1854.

2464. David Bogue.

Sealed May 1, 1854.

2524. Mark Newton.
2525. Arthur Elliott.

Sealed May 2, 1854.

2555. George Duncan, John Boyd, and John Barker.
2559. George Nasmyth.
2562. William Crosland.
2688. James Harris.
2707. Edward Briggs.
2899. John Zuill Kay.
2909. Jacques Pierre Henri Vivien.
2951. Auguste Edouard Loradoux Bellford.

1854.
41. John Henry Johnson.
78. John Fuller Boake.
196. Charles Reeves, junior, and William Wells.
502. William and Joseph Clibran.

Sealed May 3, 1854.

2554. Peter Hindle.
2556. Ebenezer Goddard.
2566. Henry Pratt.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Proprietor's Names.	Addresses.	Subject of Design.
Mar. 30	3583	C. Ward	Sheffield	Table-knife.
31	3584	T. Taylor	York	Curtain lath.
,,	3585	W. Conrads	St. John's Wood	Door-shutter.
April 6	3586	R. Lanes	Cirencester	Oil-cake mill.
7	3587	A. Holloway	Birmingham	Pocket-book fastener.
10	3588	R. and J. Rankin	Liverpool	Teeth for bone-mills.
,,	3589	Williamson, Brothers	Stainton	Mangling machine.
13	3590	T. W. Wedlake and R. Dendy	Hornchurch	Clod-crusher.

LIST OF PROVISIONAL REGISTRATIONS.

April 1	575	J. Poupard	Ball's Pond	Meat-hook.
7	576	A. Ross	Brixton-hill	Alliance shawl.
10	577	J. Ball	Portman-square	Funeral carriage.
11	578	J. Foord	Rochester	Barrow.
20	579	A. Emett	Liverpool	Chimney-top.

NOTICES TO CORRESPONDENTS.

W. W. Wynne.—The vane is supported on the point of the rod that runs up into it through the tubular projection on the lower part of it. This tubular projection has a bulge with an internal groove, in which work the ends of a pin placed through the rod after the vane is in place, a hole being formed in the bulge to admit the pin.

T. R. Blackburn.—You will find an excellent article on envelope-folding machines in Tomlinson's "Cyclopædia of Useful Arts," Part XV.

J. Ashton.—Weale has published a Work on Lighthouses in his Rudimentary Series. It is written by Alan Stevenson, C.E., the architect of the Skerryvore Lighthouse.

A Patentee.—We have experienced the same difficulty as yourself in obtaining copies of specifications from the Queen's printers. The inconvenience is one for the existence of which no sufficient reason is apparent, and we hope soon to see it remedied.

An Old Subscriber.—Received with thanks.

Errata.—No. 1601, page 340, line 4th from top, *for* ";" *read* than. On same page, line 27th from top, *for* jacket, *read* bucket.

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Mechanics' Magazine.

No. 1605.] SATURDAY, MAY 13, 1854. [Price 3 l. Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

AMERICAN FLAX-DRESSING MACHINE.

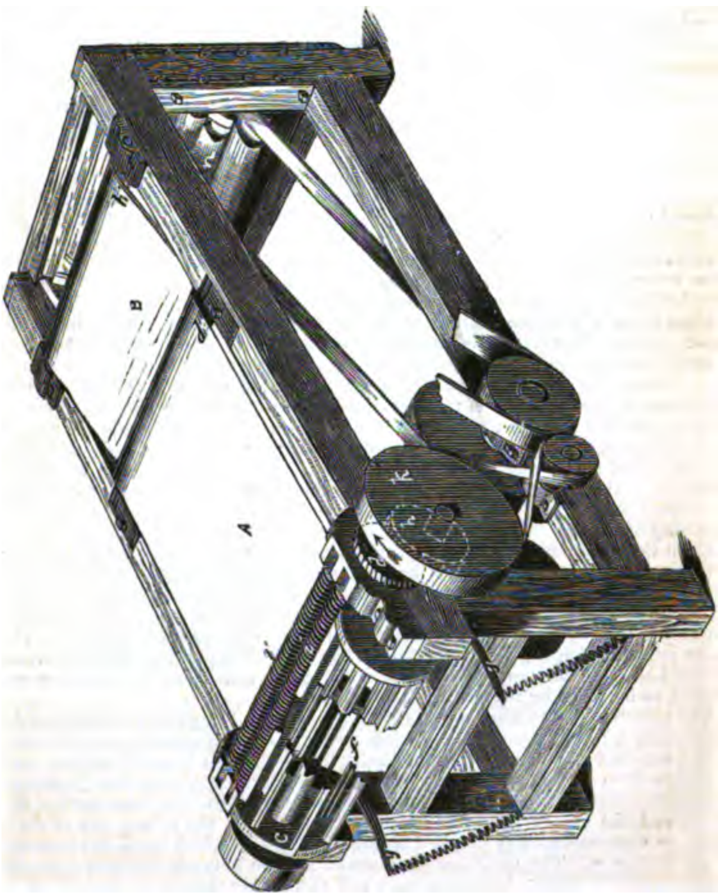


Fig. 1.

AMERICAN FLAX-DRESSING MACHINE.

(Patent dated October 29, 1853, as a communication to Mr. R. A. Brooman.)

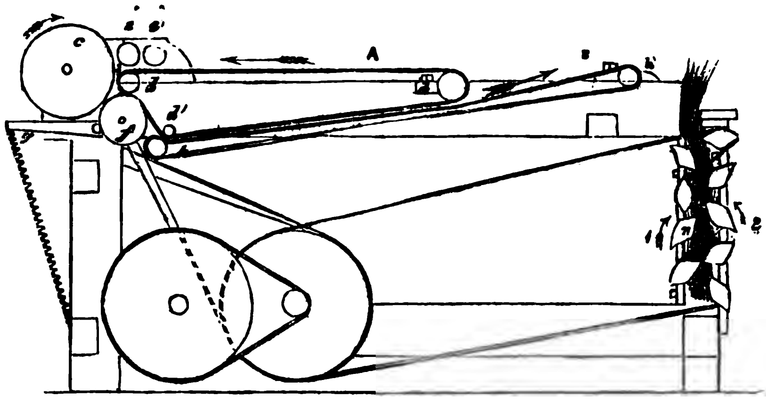
THE accompaning engravings represent an improved arrangement of machinery for dressing flax, hemp, and other similar fibrous substances, recently patented in America and this country. Fig. 1 is a perspective view, and fig. 2 a longitudinal section of the machine, which is composed of a framing having two broad endless aprons or carriers lying nearly horizontal, and at the top of the frame. One of these, A, conveys the raw material towards a breaking-cylinder composed of two circular discs, supporting between them parallel bars of wood or metal (as shown in fig. 1), and which is made to revolve rapidly in the direction shown by the arrow. This carrier, A, passes over two rollers, *d* and *d'*, which are fixed, and over another roller, *d''*, which is adjustable in the direction of the length of the apron. In front of the roller, *d*, is placed a permanent bar of metal, *e*, extending across the machine, and firmly attached at each end to the frame. Immediately below the roller, *d*, is a cylinder, *f*, formed also of parallel bars, as shown; and this cylinder is caused to press against the returning portion of the apron, A, by being suspended at the journals in the ends of the levers, *g g*, to the opposite ends of which are attached weights, or springs, in the manner shown. It thus derives its motion from contact with the apron, A, or with the flax which may pass between it and the apron; and the purpose of it is to guide the flax, which has been broken by the action of the cylinder, *c*, against the bar, *e*, on to the carrier, B. This second carrier is also an endless apron; it is situated below the first carrier, as shown, and is stretched upon two rollers, *h h'*, ; the roller *h* being fixed, and the roller *h'* being adjustable. The upper surface of the carrier, B, is thus in contact with that returning portion of the carrier, A, which is between the rollers, *d'* and *d''*, and the lower carrier extends as far beyond the upper one as is necessary to permit the attendant to remove the broken matter. This distance may obviously be less for flax than for hemp, as the straw is shorter. The roller, *h*, has upon it a pulley, *k*, by which it is driven in the direction indicated by the arrow upon *k*; and it is also so geared to the roller, *d*, as shown at *h* and *d*, fig. 1, that the surfaces of the two carriers in contact shall move with equal speed. Above the roller, *d*, is placed a grooved roller, *i*, which rests in bearings on the frame, so constructed that the roller may have play vertically. It derives rotary motion from contact with the flax upon the carrier, A, and the use of it is to keep the flax in place, and guide it properly to the breaking-cylinder. For this purpose some weight is essential, and the roller is therefore conveniently constructed of metal; though, if necessary, springs or weights may be made to press upon the journals. An additional roller may be placed at the side of that just described, as shown at *i'*. The construction and operation of this latter (when employed) are similar to the construction and operation of the roller *i*, except that the grooves are made larger, by which means the guiding and spreading of the flax to the first roller is effected more regularly.

Upon the same frame, and just beyond the roller, *h'*, is arranged a set of beaters, *n*, which are disposed in two vertical rows; the beaters of one row being set opposite to the spaces in the other, in the manner shown in fig. 2. These beaters are composed of wood or other suitable material, and are shaped as shown in the figure; they are supported upon suitable journals in the frame. A part of the ends of each is turned off so as to form pulleys, by which rotary motion is given to the beaters by means of appropriate belts, so arranged that all the beaters in one row revolve in one direction, and those in the other row in the reverse, as indicated by the arrows, 1, 2, fig. 2.

The operation of the machine is as follows:—Motion being given to the several parts by connection with an appropriate driving power, the flax is spread upon the carrier, A, in such a way that it will approach the roller, *i*, lengthwise. As it comes out over the bar, *e*, it is broken down by the bars of the cylinder, *c*, which break the wood short, leaving the bark uninjured. The cylinder, *f*, turns the broken straw upon the lower carrier, B, between which and the carrier, A, it is conveyed to a point near the reverse end of the machine, where an attendant gathers it into a handful, one end of which he throws between the two upper beaters, *n*. The motion of these draws it down between the two rows, where the woody matter is almost instantaneously and thoroughly shaken or beaten out, when the operator withdraws the fibre, and, turning it over, subjects the other end of the mass in his grasp to the same process. By the time this has been accomplished, the carrier, B, will have brought another portion ready for the beaters.

There are one or two modifications which may be made in the machine without varying the principle of its action. For instance, the endless aprons may be dispensed with, and the breakers and beaters brought so close together that the flax may be transferred by the hands of the operator directly from one to the other. The beaters also, instead of standing in a vertical portion of the frame, may be arranged so as take in the flax horizontally, and may then be fixed directly under the breakers. This change in the arrangement has the advantage of reducing the space required for a machine, and also its weight, thereby rendering it more portable.

Fig. 2.



NOTÆ MATHEMATICÆ.

(By T. T. Wilkinson, F.R.A.S., and Corresponding Member of the Manchester Literary and Philosophical Society.)

(*Continued from page* 271.)

NO. II.

Mr. Lawson's letter (given in No. 1598), does not appear to have been agreeable to those to whom it was addressed. It was never printed, so far as I am aware, nor do I find that he ever became acquainted with the *propriâ personâ* of his ingenious reviewer. In the second edition of the translation, published in 1771, Fermat's Treatise on Spherical Tangencies is added as a "Second Supplement," and a few verbal alterations are introduced into the text; but the reviewer's suggestions are not acted upon, nor had Mr. Lawson been successful in his search for the source of the method of construction, although he had consulted the works of Hugone D'Omerique, Simpson, and the "Mathematician." Had he referred to the solution of Question 469 of the "Ladies' Diary" for 1760—1, by Mr. Lionel Charlton, of Whitby, he would probably have found no difficulty in tracing its origin. The question itself requires the circle that shall pass through two given points, A, B, and cut an arc whose cord is of a given length, M N, from a given circle (C). When the chord M N = O, we have the limiting case of contact, and the construction in the "Diary" is then identical with that given by the reviewer. Mr. Charlton's use of the auxiliary circle furnishes the earliest instance of the application of the properties of Radical Axes I have met with in our mathematical publications.

The twelfth proposition of the Translation requires "the circle which shall pass through two given points and touch a given circle." Its construction had been given by various methods in different authors; but no geometer, previously to the appearance of this review, had ever had the good fortune to apply the properties of the Radical Axes of two circles to the determination of this noted problem. Mr. Lawson admits the conciseness and simplicity of this method, but he seems doubtful of its application to the remaining cases of the general problem. Had he, however, been enabled to foresee the present perfection of the theory of Radical Axes and Centres of Similitude, several of the leading properties of which even run through the Lemmas and Constructions of Vieta, he would have found

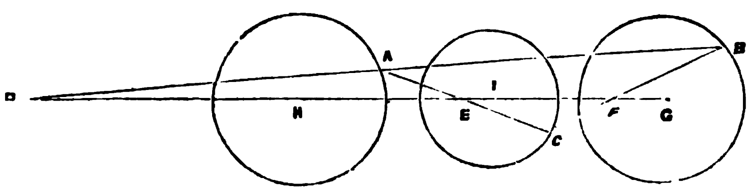
little difficulty in tracing the steps which have led to the practical refutations of his opinion by many modern geometers. The reviewer's elegant construction is identical with one to the same problem by Dr. Henry Clarke, as given in a letter to Mr. Lawson, which will be noticed in a subsequent paper; nor does it differ materially from that given by Dr. Wallace, under the signature "Scoticus" in the first volume of the new series of the "Mathematical Repository." All these constructions, however, although complete in themselves, so far as regards the auxiliary problems, evidently belong more to the infancy of the theories of Radical Axes and Centres of Similitude than to their present advanced state. Each successive method of solution may serve to mark an epoch in the progress of those classifications of collateral properties which have led to the development of our modern theories, and are undoubtedly valuable as isolated specimens of investigation; yet, even taken as a whole, they will bear no proper comparison with the complete discussions of the *general* problem by Hatchette, Binet, Bobillier, and Gergonne, or the equally elegant labours of Poncelet, Cauchy, Davies, Swale, Hearn and Catalan, on the same interesting and attractive subject. Whether the solutions of these able geometers are wholly in accordance with the requirements of the Ancient Geometry we need not here inquire; its *spirit* they certainly possess in a high degree, and it is enough for our present purpose to state that the *germs*, if not the *forms*, of the modern systems of investigation are undoubtedly to be found in the Mathematical Collections of Pappus. We are willing to admit, that by adopting these principles we may not require the assistance of all the subsidiary Lemmas alluded to by the Greek geometer as necessary for the full investigation of the Problem of Tangencies; yet the beauty and generality of the modern methods of construction so amply compensate for the want of that vigour and formality peculiar to the Ancient Geometry, that few will henceforth be found willing to undertake the task of restoring the general treatise to the state in which it probably left the hands of the great geometer of Perga. If we however refer to the late Professor Davies's "Historical Notices of an Ancient Problem" ("Mathematician," vol. iii., pp. 77, 8,) it will be found that no necessity now exists for again attempting such a restoration as shall include all the Lemmas enumerated by Pappus. From what is there stated, this appears to have been fully effected by one of his personal friends; and should this paper fortunately come under the notice of the geometer alluded to, it may serve to remind him that the publication of his labours on this portion of the Greek Geometry could not but be most acceptable to all who take an interest in this attractive branch of mathematical science. Even should the discussion add nothing to the stock of properties already known to belong to this subject, its publication would place it in comparison with those by Halley and Simson, and would once more prove to geometers what really *is* a restoration of one of the ancient treatises on pure Geometry. From the number of letters still in existence, and from the allusions they contain, it may safely be inferred that Mr. Lawson was no niggard in his correspondence. He appears at one period or other to have been in communication with almost every mathematician who raised himself above the common herd; and good taste in geometry was almost the only letter of introduction required from those who sought his friendship and advice. The petty jealousies which now too frequently exist between *academics* and *non-academics* were then confined within narrow limits, and certainly received no encouragement at his hands. He was ever ready to acknowledge *merit*, for its own sake, whether found in an individual who had enjoyed the benefits of a university education, or in one who had no better opportunities than his own good natural talents and the advice of more experienced friends.

We have no means of ascertaining with correctness when he first formed an acquaintance with Mr. William Wales, afterwards Mathematical Master of Christ's Hospital and Fellow of the Royal Society; but the following letter will show that they must have been on terms of close intimacy before Mr. Wales received his appointment as joint Astronomer to the expedition for observing the transit of Venus on the shores of Hudson's Bay, and at a time when he was little known except for his contributions to the inestimable "Ladies' Diary" and other mathematical periodicals. A glance at the biographical sketches of the life and writings of Mr. Wales, in Dr. Hutton's "Mathematical Dictionary" and in the "Penny Cyclopædia," however, will be sufficient to satisfy the reader, that although, as he afterwards admitted, he "knew *little* of Latin and *nothing* of Greek," he had eminently qualified himself for occupying an important position in the world of literature and science:

"Churchill River, Hudson's Bay,
"August 24, 1768.

"Reverend Sir,—To speak sincerely, I have no other motive for troubling you with this letter than the hope of obtaining one from you in answer to it by the return of

the ship next season. I imagine you will think it a little extraordinary to give you one trouble in order to draw you into another; but I will, notwithstanding, flatter myself I shall be able to draw you into the snare, and that your good nature will excuse the liberty. If not, I am sure I have no excuses to offer for it. Had I any mathematical news to entertain you with, or were even in a country of which the description would contain anything curious it would be different; but I have seen nothing here yet but a few ignorant wretches, the sum of whose respective possessions are bare rocks and banks of sand. As for ourselves, we have yet had no opportunity or even inclination to study much. I have indeed thought a little about the question which you showed me when I had last the happiness of being with you, but I have not yet been able to construct it. You may remember you observed to me, it seemed to you somehow or other to be *double*; and in truth it is so, for that part which requires the sides of the triangle to form given angles with the line passing through the centres of the three circles is superfluous: those angles being always determinable from the species of the triangle which is given. The question, if I remember rightly, is the following: 'To place the angular points of a triangle, similar to a given one, in the peripheries of three circles whose centres are all in the same right line; and so, *that the sides of the triangle may form given angles with the line passing through their centres.*'



"Now the part which I have underlined (*italics*) is evidently superfluous. For let (H), (I), (G), be the three given circles whose centres H, I, G, are all in the right line D G, and let A B C be the triangle whose angles are given. Produce B A until it meet G D in D: but stop; it now seems to me more easy to deduce the species of the triangle from having the angles given which the sides form with the line passing through the centres of the circles. For in the triangle, D A E the angles D and E being given, the angle D A E is known, and its supplement is the angle A of the triangle A B C = sum of the angles D and E. In like manner in the triangle C E F, the angles E and F being given, the supplement of their sum is the angle C; and thence the angle B is known. I cannot see how this can be applied to finding the moon's parallax, but will however think a little further about it with respect to that application. Now, Sir, from this small morsel I flatter myself you will exercise your charity in behalf of a poor wretch who is deprived of conversing with thinking beings for so long a period. Return me all the mathematical occurrences that may come under your notice in my absence, such as 'Notes on the Diaries,' or any thing in that way; for I shall have the 'Diaries' sent me by the ships; which, with your remarks, and those of my other kind friends who may think proper to send me a line or two, will make a feast for the greatest epicure in the universe. If you are so kind as to oblige me with a line, it must be directed to me here, and left at the Hudson's Bay House, in Fenchurch-street, London. Farewell. That health, which is the greatest happiness this world can give, may be your constant attendant, is the sincere wish and prayer of,

"Dear Sir, your very obedient Servant,

"WILLIAM WALES."

"The Rev. John Lawson,
"Swanscombe, Kent."

I am not aware that any solution has ever been given to the *general* problem of *placing a triangle, similar to a given triangle, so that its angular points may lie upon three circles anyhow given in magnitude and position.**

Particular cases have been proposed and solved in various places by several of our most eminent geometers, but a complete and purely geometrical solution, even if possible, is still a desideratum. The case when the triangle has to be similar to the triangle formed by joining the centres of the given circles, and one of the sides passes through a given point, forms Question 154 of the first series of Leybourn's "Mathematical Repository," which was proposed and answered by Professor Wallace. When the perimeter has to be a maximum or minimum, we have the Prize Question (1259) in the "Gentleman's Diary," proposed, and

* If any of our mathematical correspondents will furnish us with a general solution, we shall be glad to publish it at an early opportunity. Ed. M. M.

partly solved by the late Professor Davies: and when the given circles are concentric we fall upon Question 229, in the "Leeds Correspondent," which was proposed, and elegantly constructed, by the late J. H. Swale, of Liverpool. More recently the interesting case, when the triangle is required to be equilateral, has been offered for the consideration of French geometers by M. Prouhet, and an elegant construction, *by means of the compasses only*, has been given by M. Breton, in *tome ix.* of M. Terquem's "*Annales de Mathematiques*," for 1850.

(To be continued.)

RUTHVEN'S PROPELLER.

At the Institution of Civil Engineers the discussion has again been resumed on Mr. D. K. Clark's "Description of the Deep-Sea Fishing Steamer *Enterprise*, with Ruthven's Propeller." In allusion to the former experiments, it was shown that the power required for the propulsion of the *Enterprise*, at 9½ miles per hour, was 35 indicated horse-power, as estimated by Bourne's formula for resistance, founded on the results obtained by the *Rattler*. This power was nearly what was stated in the paper (40 horse-power), with which, also, the stated consumption of fuel was in accordance.

It was argued, with respect to the supposed loss of power in communicating to the water the velocity of the vessel, that, inasmuch as the action of the propeller was, in principle, the same as if the intercepted water was raised to the height due to the velocity imparted to it, the velocity was only lent to the water, and ready, in virtue of that head, to be refunded when required; and that the necessary engine-power was equal to that which could raise the quantity of water required for propulsion from the level of the sea to the height due to the velocity of efflux. On these principles, it was calculated, from the data contained in the paper, that in the management of the water, exclusive of all frictional resistance, the ratio of power to effect was,

The power used = 12·28 horse-power.
Ditto wasted = 3·94 ditto

Total.... 16·22 ditto

and it was concluded that there was much to be said in favour of Ruthven's mode of propulsion. The statements as to the former experiments were reiterated; viz., that the power required to communicate velocity to the water, passed through the propeller, was not afterwards utilized; for, that assuming a ball to be suspended over the vessel, at a height due to the velocity of the vessel, and moving at the same rate, it was urged that to raise the ball to that height, and to communicate to it the velocity, would obviously require just double the power necessary to raise it. Assuming the ball to be detached, it would descend vertically as regarded the vessel, and would act upon it precisely as it would if both the ball and the vessel were at rest; as a consequence, therefore, it would only act with the effect due to the height from which it fell.

As another illustration, it was assumed that the deck of a vessel was level with the surface of the surrounding medium, and that a given portion of fluid was transferred from the medium to the level of the deck; then a certain amount of power would be expended in changing the condition of the water, and imparting to it the velocity of the vessel; but as this water would only be at the level of the surrounding medium, it would not flow out again, and the power that had been absorbed would not be again utilized.

It was contended that the inference from the experiments quoted, viz., that the pressure was double the hydraulic height due to the velocity was incorrect; for the pressure was measured upon the reduced section of the *vena contracta*, which was only five-eighths of the area of the real aperture, upon which area, as had been shown, the unbalanced pressure should be estimated; and it was contended that the contrary inference led to inconsistent and anomalous results. But in no respect did these experiments apply to the case of water passing through a tube or pipe beyond the *vena contracta*, as the area of unbalanced pressure would then be immediately reduced.

Referring to the experiment quoted in the paper, and assuming the possibility of the reaction pressure being equal to double the height due to the velocity, viz., 23 feet per second, that is, $= 8\frac{6}{10}$ths feet; then double that would $= 17\frac{2}{10}$ths feet $+ \frac{9}{10}$ths foot (the height of the issue above the sea) would give a total height of $18\frac{1}{10}$th feet; this $\times$ 25 feet (the quantity of water per second) and $\times$ into 60 (seconds per minute) and $+$ 528 feet (the quantity of water raised 1 foot high per minute, per horse-power) gave 51 horse-power; then adding to that the loss from the friction of the water in the passages, as stated in the paper, together with the friction of the engine itself, it would appear that the power applied must have been = 80 horse-power instead of 40 horse-power, as stated, and thus showing that the experiment and the inference could not be reconciled.

Again it was argued that the useful effect was expressible, simply by the difference of the power consumed, in giving to the water the speed of the vessel, and the power in expelling it; that in the admission and in the expulsion of the water, reacting pressures, measured by twice the head due to the velocities of admission and expulsion, were exerted longitudinally upon the vessel, the difference of these reacting pressures expressing the useful effects. Putting V for the speed of the boat, and V′ for the effluent velocity of the water, with respect to the nozzles from which it issued; then, the power expended being taken as unity, the useful effect was found to be represented by

$$2\,V\frac{V'-V}{V'^2}$$

which showed that when the forward speed of the vessel and the effluent speed of the water were equal, there was no useful effect; and that the maximum useful effect was obtained when the effluent speed of the water was twice the speed of the vessel, and when the useful effect was just one-half of the power expended, exclusive of the friction resistance. Whereas, with the paddle, or the screw, there did not appear, theoretically, any limit to the ratio of the efficiency, —it might be equal to the power,—and in practice it was limited only by the extent of surface which it was convenient to give to the paddle-board, or to the screw. Still, the amount of power obtained by the jet was less affected by deviations from the most useful velocity, than in the case of the paddle or the screw; and there might be found to be practical advantages, which would render the plan of the jet very advantageous in numerous cases.

With respect to the unbalanced pressure of reaction, by the flow of water through the side of a vessel at rest, it was argued that all attempts to explain the subject by reference to hydrostatic principles were fallacious, and that experiment alone could determine the results. Whitelaw, in his account of the reaction water-mill, had shown, by experiment, that the reaction was measured by the weight of a column of water of twice the head, when the orifices were at rest.

A recent experiment on the reaction pressure was also described. A cylinder was fitted with a jet pipe in the side, at the bottom of the form of the *vena contracta.* It was suspended from a considerable height, so as to hang freely, and was filled with water, which was kept up to a constant level. When the water was permitted to flow out freely, an unbalanced pressure, of once and a half the hydrostatic pressure under that head, was indicated on a balance applied against the opposite side, as measured on the small section of the *vena contracta.*

With respect to the formula, showing that the maximum useful effect was only half the power expended, it was considered that the conditions of the formula did not meet the case of the propeller; for it was assumed that the engine-power was available only for expelling the water, and that the mass of the vessel necessarily discharged the duty of taking up the water. Now, the facts were stated to be, that the machine not only discharged the water, but it also previously drew it into the vessel by exhaustion; and it was contended that, under these circumstances, the maximum effect was obtained when the speed of the vessel was equal to that of the effluent water, and amounted to 100 per cent. of the engine-power, minus friction resistances.

In fine, though much difference of opinion was expressed as to the mode of action and the economy of Ruthven's propeller, it was agreed, that in numerous situations the new propeller might be found to possess practical advantages over the paddle and the screw, and that the subject demanded further inquiry and investigation, theoretically and experimentally.

WATER METERS.—CARR'S RAILWAY-CROSSING.

At a recent meeting of the Institution of Civil Engineers, the paper read, which was "On Water Meters," by Mr. David Chadwick (Salford), commenced by showing the long-experienced want of a good system of ascertaining the quantity of water delivered by Water Companies, to private houses, public establishments, or manufactories, direct from the pipes, without the intervention of cisterns, and under the varying pressures of high and low service, or under the circumstances of intermittent or constant supply.

After alluding to the statement in the Reports of the Juries for the Exhibition of 1851 (Class V.), "that no instrument had hitherto been so far perfected as to satisfy the conditions of a good meter," the paper gave a list of the patented water-meters from 1824 to 1853, and then proceeded to explain succinctly the several systems hitherto employed, under the several classifications of,—

1st. The Diaphragm principle.

2nd. The Water-wheel,—the Turbine,—the Spiral-fan,—the Drum, and their various modifications.

3rd. The Piston and Cylinder.

Of the first-class, the machine of Mr. Parkinson appeared to have been most approved; but it was deficient in sensibility, was accompanied by a noise from the tumbling lever and weight, and was very liable to derangement from wear and tear.

The second class was the most numerous; and among the machines described were those of Mr. Taylor, Mr. Siemens, Messrs. Siemens and Adamson, and Captain Ericsson; which were considered the best. All these acted upon the principle of registering by the pressure of the water against the vanes of a circular-drum, or of a spiral-screw, or of a fan. In practise they were all found to permit small quantities of water to pass continuously through the meter, without registration, in consequence of a certain amount of force being required to overcome the resistance offered by those parts of the meter in connection with the counting apparatus, before motion could be given to it. An attempt had been made by Mr. Taylor to remedy this defect, by using a gutta-percha drum of the same specific gravity as water; but though the meter, thus arranged measured correctly under full pressure, it varied much when either the inlet or the outlet pipe was partially closed.

Mr. Siemens' inventions were well spoken of for their ingenuity, but the defect abovementioned equally applied to them.

Captain Ericsson's rotary fluid meter was shown to bear a close resemblance to that of Mr. Taylor, and to be liable to the same objections.

The reciprocating fluid meter, also by Captain Ericsson, was shown to have been used, to some extent, in the United States, and to be more effective in its action.

Messrs. Donkin and Co's meter, on the principle of the disc engine, possessed a certain degree of merit, but it had not hitherto been rendered practically efficient.

The machines in ordinary use being generally defective, the want was in some degree supplied by the instrument introduced by Messrs. Hanson and Chadwick, of Salford. It consisted of a vessel of metal, into which the fluid entered by a pipe at the bottom, through a wire gauze, to prevent the admission of silt or other extraneous matter; it then passed into two semi-circular bags of vulcanized caoutchouc, firmly fixed on a level bed, one end of each bag opening into the meter; upon these bags rested three conical metal-rollers, attached to a centre-shaft, which was connected with ordinary registering wheels and dials. The water, on passing into the bags, propelled the rollers round continuously, each revolution registering exactly the contents of the bags. The rollers worked in the water, under the same pressure as in the pipes, which was in fact continued throughout, and at its exit from the meter the water did not exhibit any appreciable loss of pressure.

It was stated, that the vulcanized caoutchouc would not, in a very long period, exhibit any signs of deterioration from working under water, and that there was very little wear and tear of the bags, as the rollers passed over them, without any sensible abrasion. The machines appeared to combine the accuracy and other advantages of the piston and cylinder principle, with cheapness of construction; and it was stated, that they had been tested to measure as slowly as one gallon per hour. In general, they were shown to be capable of registering the passage of fluids at any velocity and under any ordinary pressure; they appeared to be strong, and not easily deranged, and they were so constructed as that their several parts could readily be replaced, in case of wearing out.

In the discussion, many water meters were mentioned, and among them the various measuring machines introduced by Mr. Siemens were described, and it was shown that although a single screw suspended in a current of water might allow a considerable quantity of fluid to pass unmeasured at low velocities, that defect had been counteracted by the addition of a second screw, working in the opposite direction, and by a general equalibration of the working parts; that meters of this description had been found to measure water with great accuracy at all speeds above 1 per cent. of the maximum speed; but had failed, after working during a period of from six to fifteen months, in consequence of the inevitable abrasion of the spindles working under water. To obviate this serious difficulty, which applied equally to piston or diaphragm meters, the more simple contrivance of a form analogous to that of Barker's mill was adopted. The water entered the rotating disc of this meter through a contracted funnel, and, spreading outward, issued through tangential apertures into the surrounding casing. Inasmuch as the outlets would act, to some extent, in the manner of jets, this drum would revolve proportionately faster at high velocities, to counteract which upright blades were attached to the same revolving portion, giving a resistance in the water, increasing as the square of the velocity. A uniform ratio, within the limits of two per cent., was thus practically obtained. The only step, or bearing of this meter, was effectually protected from the water by forming a closed oil chamber at the bottom of the disc, into which there entered an upright stud with a steel point, abutting

against a steel plate at the bottom of the chamber. In like manner the reducing wheels of the counter were enclosed in a sealed oil chamber.

Out of three hundred meters on this plan which had been in constant operation under the most varied circumstances and pressures for about twelve months, not one had failed in the working parts. It was contended, that as the machine had ample power to overcome extraneous resistances, and as the friction had been reduced to a minimum, variations in that friction would not affect the measurement to any sensible degree. The advantages of this meter were, its compactness, cheapness, and general applicability, either to waterworks purposes, or to measure the water pumped into steam-boilers.

After the meeting, Mr. Carr (M. Inst. C. E.) exhibited models of his improved railway crossing. The chief deviation from the form of the common crossing appeared to consist in filling up the hollow on the inside of the wing rails, so as to afford support to the part where the wheels bear partially on them, and thus to preclude the possibility of shearing off the overhanging flange, which was stated to occur frequently with ordinary crossings. The point rails were similarly filled, and also blocked out, so as to render the point one solid piece, of much greater strength than usual. The joint of the point rails being on a chair, appeared to obviate the necessity of bolting the rails together, whilst it dispensed with the slice-joint of the ordinary construction.

A loose block was also introduced between one wing-rail and the point, in each of the point chairs; this alteration allowed the wing-rail, the loose block, and the point, to be all wedged firmly in the chair by one key.

It was shown that although the upper surfaces of the filled wing-rails and the solid point might be worn down, they could not be crushed, and the deficiency of metal which might be produced by wear could be easily restored by heating the rail, and slightly hollowing the side; whereas in the common crossing, the overhanging flange being liable to be sheared off or crushed, entirely destroys the rail; so that in one case a few shillings would restore the crossing, whilst in the other, it was entirely destroyed, and must be replaced by a new one.

ROCK'S PATENT TARPAULIN ROLLER.

It is desirable to possess, both for railway carriages and wagons, some simple mode of opening or closing them at pleasure. Third-class carriages, in the summer season, holding many passengers, require the freest ventilation, both at the sides and the roof; and they need also an easy means of closing at pleasure, in case of sudden rain, or in tunnels. Wagons require a simple method of covering and uncovering, so as to be easily loaded and unloaded. With close wagons, the processes of loading and unloading are difficult, and goods are damaged in transit, from the impossibility of arranging them securely in a permanently-covered space, within which the loaders must themselves stand whilst at work.

The disadvantages of uncovered wagons have been well set forth by Mr. Henry H. Henson, the Wagon superintendent of the London and North-Western Railway, in a paper read before the Institution of Mechanical Engineers, July, 1851. He says:

"Another cause of serious expense, attached almost exclusively to open wagons, is the great danger and outlay incurred by the defective state of the floors, which are found to decay rapidly, the consequence of continual exposure to the different effects of summer and winter. No attention had been directed to the importance of constructing wagon stock to remove this serious defect until the writer gave it his consideration. He has seen hundreds of the open goods and cattle wagons standing, in winter, with two inches depth of manure, and water covering the entire area of the floor, in which holes have been afterwards made to let out the water. One of the greatest practical evils resulting from rotten floors is, the great facility with which the legs of the cattle have slipped through and been broken. The trains have, in some instances, been thrown from the line, causing much delay and expense. In one or two cases, the beast fell completely through the bottom of the wagon upon the line, whereby the traffic was interrupted, and much damage done. Open merchandise wagons would be the source of many more accidents, and greater expense, but for the vigilance of experienced and attentive local examiners of the trains at the stations on the road. The constant expense caused by the exposure of the open wagons to the deteriorating influence of the weather, when out of use, is most serious in amount, as there are several millions' worth of wagon property undergoing depreciation from this cause, for which the Companies have to pay a tax equal in amount to that for the employment of the work."

The cost of the ordinary tarpaulin employed for covering railways was also shown by Mr. Henson to be enormous, amounting, in one case, to £12,000 annually.

Mr. Rock, of Hastings, has, however, recently patented a method of applying tarpaulins to this purpose, with great economy and efficiency. The simple mode which he has devised consists in the arrangement of the tarpaulin on a roller, so that one man or boy, by means of a winch, may open or close the carriage or wagon at pleasure.

Fig. 1.

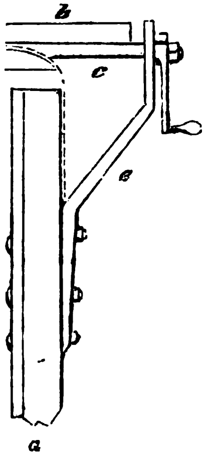


Fig. 2.

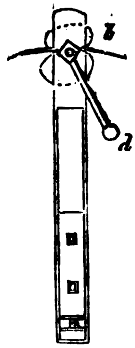


Fig. 1 shows the roller and its standard attached to one end of a wagon. *a* is the wagon end; *b*, the roller, the lower half of which is shortened and rounded to allow the tarpaulin to fall, as shown by dotted lines; *c* is the spindle; *d*, the winch; and *e*, the standard to carry the roller. Fig. 2 is a back view of the standard, winch, and roller. The only fastening necessary for a tarpaulin fixed in this manner is a line at each corner, attached to an eye in the end of the wagon.

By this simple arrangement the covering is wound up entirely out of the way, leaving the whole interior of the wagon open and free to the action of the crane. The cost of this mode of covering wagons will not greatly exceed, including rollers and ironwork, the prices for the tarpaulins alone.

The method of applying the rolled-up covering to carriages is identical with that described above for wagons, and therefore does not require separate description or illustration.

It is scarcely necessary to remark that the saving to companies using this roller will not be confined to the preservation of the sheet, and the consequent prevention of damage to the goods, but will also apply to the saving of labour and time in covering and uncovering the wagons; an object of some importance, especially in the case of the delay of trains, sometimes unavoidable.

By making the ends of the wagon sufficiently high, the roller would serve as a gauge in loading, so as to clear tunnels and bridges; but there is no valid reason why the low-ended truck should not also have its tarpaulin and roller, or standards to receive them when required; indeed, the applicability of the plan now offered to all kinds of existing wagon stock is one of its chief recommendations. It has been in use for several months on the South-Eastern Railway, with satisfactory results.

OBSERVATIONS ON MENTAL EDUCATION.

On Saturday last Professor Faraday addressed to the members of the Royal Institution the second of seven lectures on Education, now in course of delivery. The lecture was entitled "Observations on Mental Education;" and in it the Professor more fully developed his opinions concerning the deficiency of judgment which he considers was displayed by what are termed the educated classes of the present day at the time of the table-turning mania.

It might, he said, be supposed that that mania had ceased, and that it was useless to dwell longer on the delusion; but he had reason to know that it was not so, for he frequently received letters asking if he still retained his opinion respecting it. Admitting, however, the mania to be extinct, it would no less serve as an illustration of the extent to which minds not well regulated may be led astray, and as a warning against hastily drawing conclusions without a careful examination of the phenomena, especially when those conclusions are opposed to laws founded on the most careful investigations of the phenomena of nature by men of the highest scientific attainments. Those, for instance, who assert that a heavy body can be raised from the ground and be attracted towards the hand without exerting any re-acting force on the hand that lifts it, make an assertion directly opposed to the laws of gravitation, and they ought at least to have examined the phenomena before arriving at such a conclusion. If a heavy body like a table could thus be raised in opposition to gravitation, surely it might be expected that the same power would be able to disturb the equipoise of a balance; but that it was unable to do. If such a power existed, which could attract without re-action, it would indeed be of the most important practical utility, for we might con-

ceive its extension to such a point that the touch of a hand would draw a railway train without effort. Professor Faraday exhibited the apparatus, with index attached, which he had contrived for proving the fallacy of table turning. It consisted of two small flat pieces of wood, held together by India rubber springs, and separated by small rollers that allowed the pieces of wood to move freely over each other. The movement of the upper one was shown by an index that pointed to the right or to the left according to the direction of the motion. This little apparatus, when placed under the hands of a practised table-turner, had the curious effect of paralysing his power, when he looked at the index, and thus became conscious of the real movement of his hands; but when the index was concealed from view the table began to turn as briskly as if the apparatus did not intervene. This proved that the movement of the table was effected by the direct action of the muscles exerted involuntarily. Professor Faraday dwelt much on the importance of self-culture for preparing the mind for the exercise of correct judgment, and on the necessity of accumulating facts and observations, and then accustoming the mind to reason upon them, and to deduce conclusions from a great variety of well-established data. In the study of the physical sciences, to which he particularly alluded, the importance of withholding the judgment till a sufficient number of facts have been collected by experiments, is especially necessary. He exhibited several experiments, for the purpose of showing how easily any one might be misled into false conclusions by the results of single experiments, and the necessity of accumulating facts in different ways before any sound judgment can be formed. He alluded particularly to Arago's discovery of the influence on a suspended magnet of a rotating disc of metal immediately beneath. No sooner was the phenomenon made known than numerous explanations of the cause were advanced by various persons without due consideration; but whilst they were so ready with their explanations, Arago himself was silent. The discoverer of the effect abstained from assigning any cause, for he felt that he was not in possession of sufficient facts to enable him to form a correct judgment, and it was not till some time after others had assumed a variety of erroneous causes that he was led to the conclusion that the effect was due to the excitement of electric currents. Professor Faraday reverted from time to time to the table-turning delusion and to spirit-rapping as evidence of the ill-regulated condition of the public mind; and with considerable warmth he denied the right of those who adduced phenomena opposed to the recognised laws of nature to demand an explanation of the cause from others. He said he had entered into an examination of the phenomena of table-turning with a view to ascertain whether they were attributable to any hitherto undiscovered force, and the result of his investigations had proved that there is no foundation whatever for the belief in such force. If asked to explain all the phenomena he would not undertake to do so, any more than he could explain all the tricks of a conjuror; but, because he did not know the cause, he was not to assume that the laws of nature were suspended or reversed. Among the speculations of the present day which, not being founded on sound deductions from the existing state of scientific knowledge, and therefore impracticable, were classed perpetual motion, the caloric engine, the electric light, and hydrocarbon gas. In the self-culture of the mind, Professor Faraday observed that humility is essentially requisite, for without a full conviction of the liability to err, there would not be that painstaking so necessary to the discovery of truth. The little attention that is generally paid to cultivate the judgment was alluded to, in conclusion, as one of the anomalies of this educational age; for while a large portion of time is frequently devoted to acquiring an indifferent knowledge of a mechanical musical instrument, that infinitely superior instrument, the mind, is generally neglected.

PROPULSION BY JETS OF WATER.

To the Editor of the Mechanics' Magazine.

SIR,—I cannot admit, with your correspondent "D. K. C.," that the manner in which I have noticed the jet propeller "would lead one to suppose that I had exhausted the consideration of the question." The question is one in which I have long been interested, and I have watched the various experiments that have been made with the propeller. I have also carefully considered the paper read at the Institution of Civil Engineers, by Mr. D. K. Clark (*vide* page 294), and have been present at the discussion thereon. Upon a review of all the evidence hitherto produced on behalf of the jet propeller, I can come to no other conclusion than that which I expressed at page 373, and which agrees with that of another correspondent, recorded in your pages just twenty years ago.*

"D. K. C." charges me with not understanding "either the detail of the propeller

* Vol. xxii., page 36.

employed by Ruthven, or the principles on which the propeller operates," and then proceeds to enlighten your readers with some (decidedly original) views of his own upon the subject. "D. K. C." assures us (and he seems to be in earnest, too), that when the function of an instrument is "to send water through great lengths of pipe, in some cases at high velocities," it is a LIFTING AND FORCING PUMP; but that "if it simply *lifts and forces* water through very short and very wide channels, and at moderate velocities," it is a *propeller!* But what are the dimensions of the channels, and what the velocity of the currents that assign the instrument to the one or the other of these classes, is not stated.

In Mr. D. K. Clark's paper, read before the Institution of Civil Engineers, he describes the character, burthen, and draught of water of the vessel (the *Enterprise*), which constitutes the first element of the question to be investigated; he next describes the motive power,—the second element,—consisting of a steam boiler and pair of oscillating steam engines. Then follow particulars of the centrifugal pump by which the jet is produced, and what I consider the fourth element, the jet itself—the motive propelling agent. It will, I apprehend, be admitted that each one of these four elements may be individually of an inferior or superior character, proportionably influencing the results. The evaporating capacities of steam boilers will vary—steam engines may be of greater or less efficiency —of the thousand and one forms of pumps, some have advantages not possessed by others; and all these elements are intimately concerned in the production of the propelling jet. But the jet once obtained, it must be evident that its power as a propelling agent will be the same, *no matter how produced.* The most economical method of producing the jet is an important item in the process; but a jet of the required dimensions and velocity will produce the same effect in propelling a boat, whether the original motive power has been wind or steam, animal power or manual labour; and whether the jet has been produced by an elevated reservoir, a centrifugal pump, or any other possible contrivance. From the manner in which "D. K. C." jumbles and confounds the foregoing elements, it is really a question if he is not in that very state of ignorance which he ascribes to me. "D. K. C." calls the centrifugal pump, "the propeller;" he might, with equal propriety, call the steam engine "the propeller." The jet, and the jet alone should be regarded as the propeller; the engine and pumps, the instruments by which the jet is obtained.

"D. K. C." says, "The application of the jet system to the steam floating fire-engine was made in entire ignorance of the hydraulic principle involved in the application." Anything more absurd than this statement can hardly be imagined. "D. K. C." says, "There are certain best ratios between the speed of the vessel and the effluent speed of the jets, determined by circumstances, and suitable for the obtainment of the maximum efficiency." Well, the steam floating fire-engine furnished a ready means of "determining these circumstances" (within certain limits), and such "good results" were obtained, that—"D. K. C." is surprised! Again, we have on record an account of an experiment, in which manual power applied to pressure-pumps (as "D. K. C." would possibly say, in entire ignorance of the hydraulic principle involved in the application) has produced a jet, the propelling power of which, so far as speed is concerned, leaves all Mr. Ruthven's (later) performances very far behind. I allude to the performance of an "ingenious mechanic" who, in July, 1840, propelled a boat upon the Forth and Clyde Canal, by means of pumps worked by himself, "at a rate of not less than fifteen miles per hour;" * a result so satisfactory that he threatened to carry out the experiment upon a larger scale, and to patent his invention.

"D. K. C." has alluded to "the conflicting opinions which were maintained in the late discussions at the Institution of Civil Engineers." Mr. Brunel justly characterized it as "a fearful state of things," that the members should be disputing about points upon which every tyro in hydrostatics might be supposed to be well informed. Mr. Bidder contended that the hydrostatic pressure of a quiescent column of water and of a similar column in motion was the same. The action of the hydraulic ram is a practical proof of the contrary. Other members contended that the whole unbalanced hydraulic pressure due to the height of the column of water was *twice* the hydrostatic pressure due to the column of water, this pressure diminishing as the speed of the boat increased.†

It was stated that the *Enterprise* had been placed at Mr. Brunel's service, and he promised the members that he would institute a series of carefully-conducted experiments, to ascertain the capabilities of the jet propeller; at the same time, he held out no expectation of its ever competing, either in speed or economy, with the paddle-wheel. We may, therefore, feel assured that this propeller *will* receive the "more mature

* *Mech. Mag.*, vol. xxxiii., page 144.
† Vide page 843.

consideration" of which "D. K. C." thinks it worthy; and none will be more agreeably surprised than myself, should the results show that, after twenty years' consideration of the subject, I have still come to an erroneous conclusion respecting it.

I am, Sir, yours, &c.,
WM. BADDELEY.

13, Angell-terrace, Islington, May 9, 1854.

MELLISH'S PATENT PERFORATED PLATE-GLASS VENTILATORS.

To the Editor of the Mechanics' Magazine.

SIR,—The importance of ventilation is now pretty well understood, and many varied contrivances for carrying out this vital principle have been resorted to. The great object to be accomplished is, the provision of an outlet for vitiated air, or an inlet for pure air, so nicely adjusted and arranged, that while these desirable results are attained, no unpleasant draughts shall be occasioned, nor any portion of light be intercepted. In these respects the patent perforated pane of Mr. Mellish surpasses all others. Mr. Mellish takes strips of plate-glass, varying from 1½ inches to 2 inches or more in width, and by means of revolving cutters produces a series of notches in the edges of the strips, so that when put together to form a pane, they present a number of ornamental openings, as shown in the accompanying engraving (fig. 1). The edges of the strips of glass, as well as the edges of the apertures, being bevelled and polished, as shown in the plan view (fig. 2), they present an exceedingly beautiful appearance, arising from the play of the prismatic colours; especially if the sun's rays fall upon the pane, when the appearance resembles that of an elegant cut glass chandelier. The smallness of the apertures effectually breaks up any entering currents of air, an effect that is still further promoted by the bevelled edges of the apertures, which induce converging and neutralizing currents proportioned to the increasing force of the wind. These finely perforated panes, which cause no projection, and are easily cleaned, admit both light and air, but exclude rain and dust; they form an ornamental and exceedingly appropriate finish for the upper part of plate-glass in shop windows, permitting the escape of moist and heated vapours, injurious alike to the health of the inmates and the goods contained therein. Few shopkeepers have any adequate idea of the mischievous effects of heated air upon various kinds of goods. The rottenness induced, in hosiery goods for instance, stored on the upper shelves of gas-lit shops, is however, of the most serious character. The introduction of ventilators into pleasure-carriages is a decided novelty, and to these the plate-glass ventilators of Mr. Mellish have been applied by Messrs. Davies and Son with great advantage. The great facility with which these ventilators can be adapted to fit openings of every form and character, their beauty and efficiency, together with the moderate price at which they are supplied, argue well for their universal introduction.

Fig. 1.

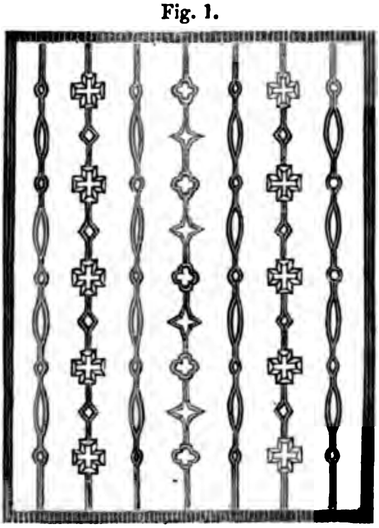


Fig. 2.

I remain, Sir, yours, &c.,
WM. BADDELEY.

13, Angell-terrace, Islington, April 23, 1854.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

COLLIER, GEORGE, of Halifax, York, mechanic. *Improvements in the manufacture of carpets and other fabrics.* Patent dated October 19, 1853. (No. 2412.)

Claims.—1. The combination with a power-loom working with a single beat up, and wherein a series of independent wires are used, of apparatus for withdrawing and carrying the last wire and inserting it again into the fabric. 2. The using of wires

thicker at the one end than the other, parts in combination with an instrument coming from behind the batten outside of the slay to press the ends of all the wires towards the breast beam just when the hook or instrument comes to take the last wire, (the wire nearest the breast beam), in order to ensure the last wire being taken and withdrawn by the hook or instrument. 3. The manufacturing of terry or cut pile fabrics in power-looms by combining the use of wires with the placing of the terry or pile warps on to two or more beams, so that the warps carried by the beams may be brought up to form the pile in succession by the working of the power-loom.

BARRACLOUGH, CHARLES, of Halifax, York, mechanic. *Improvements in the manufacture of carpets and other fabrics.* Patent dated October 19, 1853. (No. 2414.)

This invention consists in apparatus employed for stopping such looms, should a wire not be correctly taken or a weft not thrown in to the shed. For this purpose the wire carrier has applied to it an instrument or catch, which, if not supported, descends, and comes in the way of a lever or instrument, and is thus the means of stopping the loom; but if the carrier takes a wire correctly, the loom goes on working.

BARTON, JAMES, of Robert-street, Hampstead-road, Middlesex, ironmonger. *Improvements in fittings for stables.* Patent dated October 19, 1853. (No. 2415.)

This invention consists—1. In substituting for the rack commonly employed a hay-box, composed of plain or corrugated iron, and perforated with apertures to ventilate the hay. 2. In providing the water-trough with a branch pipe leading to another pipe having two stop-cocks, one above and the other below its connection with the branch, so that by opening them alternately the water may be admitted to, and allowed to escape from, the trough, the pipe being in communication with a cistern and leading to a sink. 3. The employment of a guard-roller of hollow iron, or of wood covered with sheet metal, placed in front of the hay-box, manger, and water-trough. 4. In a means of hanging and working the halter, balls, and straps or ropes, by suspending the balls from a bracket fixed to a post or to the wall at the back of the fittings, and then bringing the ends of the straps or ropes over or under friction-rollers fitted in the top plate or frame, so that the balls and straps are prevented from coming in contact with the horse's legs, and all strain produced by a horse leaning back in his stall is borne by the bracket at the back of the fitting.

DUSSUC, ALEXIS, of Grove-place, Brompton, gentleman. *An improved machine for digging and cultivating land.* Patent dated October 19, 1853. (No. 2418.)

Supported on a suitable carriage is an ordinary locomotive engine and boiler, having two pairs of steam cylinders connected by cranks and rods to the axles of the driving-wheels, which are made to revolve independently of each other, so as to allow of the machine being turned in any direction, each wheel being in connection with one pair of steam cylinders. Concentric with each driving-wheel is a large spur or toothed wheel, gearing into an intermediate spur-wheel, which actuates the ploughing apparatus.

BINNS, WILLIAM, of Leeds, York, cloth-dresser. *An improvement in the treatment or finishing of woollen and worsted fabrics.* Patent dated October 19, 1853. (No. 2419.)

Claim. — The subjecting woollen and worsted fabrics to pressure between one pair, or two or more pairs of cylinders or rollers, one of such pair, or of every such pair of cylinders or rollers being heated for the purpose of giving a "press face" to such fabrics.

RUSSELL, WILLIAM, of Birmingham, Warwick, tube-drawer. *An improvement or improvements in the manufacture of copper tubes.* Patent dated October 19, 1853. (No. 2421.)

The process described by the inventor is so conducted that the tube at one stage of its manufacture is thinner in substance than it is when completed; that is, in completing the said tube while its diameter is diminished, the thickness of its substance is increased. The invention also consists in increasing the diameter of copper tubes, where the same is desirable.

FRANCE, JOHN, of North Wharf-road, Paddington, Middlesex. *An improved morticing-machine.* Patent dated October 19, 1853. (No. 2423.)

The wood to be morticed is placed upon a table, and the workman then places his foot upon a treddle, by which the chisel is moved downwards through the wood, and upon the pressure being removed from the treddle, the elastic force of a spring raises the chisel up, and so on alternately during the forming of the mortice.

ROTH, JULIUS AUGUSTUS, of Philadelphia, Pennsylvania, United States, chemist. *Improvements in the bleaching and dying of fibres or fibrous materials, part of which improvements is applicable to the drying of woven and other textile manufactures.* Patent dated October 20, 1853. (No. 2426.)

Claims.—1. A series of combs and a frame to which the combs are attached for the purpose of supporting the yarn in a loose or open state, whereby the manufacturer is enabled properly to expose it to the chemi-

cal action of certain solutions. 2. A series of vats furnished severally with a set of moveable squeezing rollers, in which vats the frame just mentioned, when charged with yarn is suspended for the purpose of saturating the yarn.

MELVILLE, WILLIAM, of Burntisland, Fife, North Britain, tailor. *Improvements in apparatus for drawing ships out of water.* (A communication.) Patent dated October 20, 1853. (No. 2427.)

In this invention the hauling is effected by a steam engine laid down by the side of the slip, and a shaft from it is fitted up with disconnecting gear, and reversed motions with gearing for varying the rate of traverse of the vessel. The last shaft of the series included in the gearing carries a spur pinion in gear with a spur-wheel fast on the extreme landward end of a horizontal screw-spindle, supported in suitable bearings in a direction parallel with the line of the ship's traverse, or the length of the slip.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in apparatus for sustaining bodies in the water.* (A communication.) Patent dated October 21, 1853. (No. 2429.)

This apparatus consists of a garment composed of any suitable impermeable material that is intended to enclose the arms, body, and legs of the wearer. It is tied round the neck, and is fitted with gloves and boots for the hands and feet. The support is derived from a zone stuffed with carded cotton, and covered with any suitable material, worn under the arms.

WARBURTON, JAMES, of Addingham, York, spinner. *Improvements in preparing rape-seed oil.* (A communication.) Patent dated October 21, 1853. (No. 2433.)

In a suitable vessel containing fifty-two parts of alkali (caustic soda) of a specific gravity of 1010 are to be put, according to this invention, 100lbs. of refined rape-seed oil, and these are to be stirred with a wooden ladle till well mixed. The mixture, after being allowed to stand twenty-four hours undisturbed in a cold place, is then to be warmed slowly, and well stirred up again, after which the liquor is to be left another twenty-four hours, in which time all the oil will generally have separated itself; but should this not be entirely the case, the separation can be effected by a small quantity of spirits of wine. The oil thus taken off from the liquor is to be well washed with hot water, till it is obtained pure, without taste or colour.

MICHEL, CHARLES NICOLAS, and AUGUSTIN LECOMTE, of Paris, France. *Certain improvements in windows.* Patent dated October 21, 1853. (No. 2434.)

This improved window consists chiefly of two moveable sash windows similar to those called French windows, but instead of turning on hinges, they are hung on a horizontal bar, by means of castors, on which they can be rolled out of sight into recesses formed on each side of the window.

CHALLETON, JEAN FRANÇOIS FELIX, of Paris, France. *Certain improvements in carbonizing and distilling peat, coal, wood, and other animal, vegetable, and mineral substances.* Patent dated October 21, 1853. (No. 2435.)

This invention consists in constructing apparatus "serving, firstly, to carbonize and distil, in a progressive and continuous manner, peat, coal, cannel, or parrot coal, and other bituminous substances, wood, bones, and other mineral, vegetable, and animal substances, so as to extract the gases, oils, resinous, and ammoniacal substances, acetic acid, and other matters which are contained in them; secondly, to purify the gases produced by the above carbonization."

FOUQUE, PIERRE MARIE, civil engineer, LOUIS RENÉ HÉBERT and VINCENT ETIENNE DORET LE MARNEUR, of Paris, France. *A fortune-rudder in bronze.* Patent dated October 21, 1853. (No. 2436.)

This invention consists in the application of a rudder in bronze, hung at the stern-post of vessels or ships, and to be secured flat against the deadwood whilst not in use, so that it may be instantly brought into use whenever the ordinary rudder may be destroyed or injured.

LLOYD, SAMUEL, the younger, of Wednesbury, Stafford, engineer. *Improvements in the construction of turn-tables.* Patent dated October 21, 1853. (No. 2437.)

Claims.—1. The introduction of a toggle lever, or of a balance lever or levers, under the centre pin or pivot of turn-tables, for the purpose of raising the table-top, and supporting it on the centre pin or pivot while in use. 2. Certain means of withdrawing the supports from beneath the periphery of turn-tables, for the purpose of throwing the weight of the table-top on the centre pin or pivot. 3. The employment of blocks, wedges, or supports beneath the peripheries of turn-tables, to sustain their weight when lifted.

GREENBANK, JAMES, and SAMUEL PILKINGTON, of Withnell, Lancaster, overlookers in the employ of Messrs. John Park and Sons, of Withnell, aforesaid. *Improvements in machinery for spinning cotton and other fibrous substances.* Patent dated October 21, 1853. (No. 2438.)

This invention consists,—1. In the application to self-acting mules of a centrifugal governor, by which the requisite mechanism is put into operation for moving the car-

riage-strap from the fast to the loose pulley, when the operation of twisting the yarn is completed. 2. In certain improved machinery for applying a break to the back driving shaft, for checking the momentum of the parts by which the carriage is worked. 3. In a peculiar application of a worm-wheel.

BENTLEY, HARRY, of Salford, Lancaster, roller and spindle-maker, and millwright. *Improvements in steam-boilers, and in the method of setting or fixing the same.* Patent dated October 22, 1853. (No. 2441.)

The inventor fixes a vertical tube through the centre of each flue, through which tube the water passes, and connects the flues at the back part or extremity of the boiler, so that the heat or flames from them will meet in the combustion chamber, and then pass through the brick flue or flues to the chimney in the ordinary manner.

BAILY, JOHN, of Mount-street, Grosvenor-square, London. *The cure of the roup and other diseases in fowls and poultry.* Patent dated October 22, 1853. (No. 2442.)

This invention consists in forming a pill of the following ingredients:—Powdered bark, two and a half grains; powdered ginger, two and a half grains; powdered rhubarb, two and a half grains; sulphate of zinc, one-tenth of a grain; and water, two grains.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in mills for grinding.* (A communication.) Patent dated October 22, 1853. (No. 2447.)

In this invention the shaft, which gives motion to the stone, is driven by an intermediate shaft, fitted with a friction pulley, and driven by contact alone. This shaft communicates its movement to the main shaft by a pinion and spur-wheel, the latter being keyed on to the main shaft, which is made hollow, and fitted with a funnel, or expanded mouth-piece, at its upper extremity to receive the grain.

KRAUT, HENRY, of Zurich, in Switzerland, engineer. *Improvements in apparatus for regulating the temperature of stoves and furnaces, and of water, air, or other fluids contained in vessels or chambers, the strength of spirituous liquors and of chemical mixtures, and the hygrometric state of the air in buildings, rooms, &c.* Patent dated October 24, 1853. (No. 2448.)

This invention consists in the application of an electric current, produced by the thermo-electric, rotary, constant, or any other battery, to the purposes described in the title.

STAINTON, THOMAS, of South Shields, Durham, cast-iron and brass-founder. *Improvements in steering apparatus.* Patent dated October 24, 1853. (No. 2449.)

This invention relates to a modification of the ordinary wheel and tiller, and consists in the employment of a drum containing one or more annular grooves of sufficient width only to allow of the chain being wound on in a single coil, without overlapping.

YOUNG, JAMES DENOON, of Westminster, Middlesex, engineer and manufacturer. *Improvements in casting.* Patent dated October 24, 1853. (No. 2450.)

Claims.—1. A mode "of casting by means of moulds surrounded with or placed over hot water, or steam or vapour, and also in some cases with hollow cores fitted with hot water, or steam or vapour, for the purpose of protecting the moulds and cores, and preventing the chilling or hardening of the castings." 2. A mode "of casting by means of moulds, and in some cases with hollow cores, to which cold water is applied for the purpose of chilling or hardening the castings."

BREWSTER, CHARLES, of Dunmow, Essex. *Improvements in printing machinery.* (A communication.) Patent dated October 24, 1853. (No. 2451.)

This invention consists in fixing the form of type, and of giving to the printing cylinder a to-and-fro, and also a rotary motion over it. The type is inked by means of the inking apparatus being also caused to move to-and-fro over the type.

ARCHDEACON, EDWARD JOHN MONTAGU, of Gravel-lane, Southwark. *An improved method of indicating places, divisions, or contents, in directories.* Patent dated October 24, 1853. (2452.)

Claim.—The application of external studs, knobs, or projections to directories, for the purpose of indicating the contents thereof, and of facilitating reference thereto.

SUMMERFIELD, THOMAS, of Birmingham, Warwick, glass manufacturer. *Improvements in the construction and manufacture of windows.* Patent dated October 25, 1853. (No. 2455.)

This invention consists mainly in "constructing window-bars of glass, enamel, china, or other vitreous or semi-vitreous substances, having grooves or depressions for the reception of the panes of glass, whether the said window-bars are solid or hollow, or are made in one or more pieces, or have or have not an internal metallic support."

FORDRED, JOHN, of Dover, Kent, gentleman, and THOMAS BOYLE, of Forest-gate, Essex, gentleman. *Improvements in daylight reflectors, and in apparatus to be used in connection therewith.* Patent dated October 28, 1853. (No. 2458.)

A full description of this invention will be given hereafter.

BRADY, JOHN DRUMGOOLE, of Cam-

bridge-terrace, Hyde-park, Middlesex, Esq. *An appendage to knapsacks.* Patent dated October 25, 1853. (No. 2459.)

This invention consists in the employment, as an appendage to knapsacks, of a supplementary pouch or ammunition-case, suspended at the inner side of the knapsack from a cross strap attached thereto, or to the slinging-straps of the knapsack, in such a position that it may be readily detached by unbuckling its suspending-strap without taking off the knapsack, and then placed upon the waist-belt when required for immediate use.

CURTIS, ALFRED, of Sarratt Mills, Herts, paper-manufacturer, and BRYAN DONKIN, the younger, of Bermondsey, Surrey, engineer. *Improvements in machinery for cutting rags, ropes, fibrous, and other substances.* Patent dated October 25, 1853. (No. 2460.)

A full description of this invention formed the first article of No. 1603.

BEASLEY, JOSEPH, jun., of Smethwick, Stafford, iron-master. *Improvements in the construction and arrangement of puddling-furnaces, which improvements are also applicable to other furnaces used in the generation of steam.* Patent dated October 25, 1853. (No. 2461.)

Claim.—The arrangement and application of a system of tubing, as described, for the purpose of rendering available the waste heat from puddling and other furnaces, and employing it in the generation of steam, and for preserving and economising the mineral or pottery mine used in lining puddling-chambers.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *An improved construction of railway carriage-axle.* (A communication.) Patent dated October 25, 1853. (No. 2462.)

In this invention the axle is formed of a solid and hollow part, the former being inserted in the chamber of the latter, and secured in place by a key which passes through the outside piece into an annular groove in the inside part, the whole being retained in place by a band and set screw. When thus combined, the wheels move together, or independently of each other, as may be required.

NEWTON, ALFRED VINCENT, of Chancery-lane, mechanical draughtsman. *An improved construction of printing-presses.* (A communication.) Patent dated October 25, 1853. (No. 2463.)

In this invention the type is mounted on a reciprocating table or carriage, which slides in guides, and enters a stationary ink-distributing cylinder (through the periphery of it) when the type is to be inked, in order that the inking-rollers, which are carried by rotating arms mounted on the axle of the cylinder, may pass over the face of the type in making the circuit of the exterior periphery of the ink-distributing cylinder.

BOTTOMLEY, WILLIAM, of North Brierley, Bradford, York, designer and pattern-card maker. *Improved machinery for hand and power-loom weaving, and especially applicable to weaving figured, fancy, and checked goods, with any number of picks, by Jacquard engines.* Patent dated October 25, 1853. (No. 2465.)

This invention consists in the construction of mechanism which is connected to the rising shuttle-boxes of fancy looms, and which is put in motion by means of cords connected to it, and to needles in the Jacquard machine, so as to bring one or other of the shuttles opposite to or on a level with the shuttle-race, as required.

GOODYEAR, CHARLES, of Avenue-road, St. John's-wood, Middlesex. *Improvements in the manufacture of boots and shoes.* Patent dated October 25, 1853. (No. 2466.)

In carrying out these improvements, elastic and flexible treads are used in the fore parts of the soles of boots and shoes, and self-acting valves are applied to prevent the air beneath the foot from passing in any other than the desired directions.

GRIMSHAW, WESTON, of Mossley, Antrim, Ireland. *Improvements in steam boilers.* Patent dated October 25, 1853. (No. 2467.)

This invention consists in combining two boilers, and in adapting the fires to them in a peculiar manner. "The portion of the combined boilers in which the highest pressure of steam is generated, is that to which the furnace is constructed, and in place of the heat and products of combustion passing from such first boiler to the chimney, they are caused to pass through tubular flues formed through the next boiler, the water spaces and chests of the two boilers being separated."

DAVIS, MARCUS, of Cloudesley-square, Islington, Middlesex. *Improvements in the treatment of fibrous materials other than flax and hemp.* (A communication.) Patent dated October 25, 1853. (No. 2468.)

This invention consists in subjecting vegetable fibres to a solution of the sulphate of alumina, alum, borax, common salt, Epsom salt, Glauber's salt, nitre, sal ammoniac, or an equivalent of any one of these, in order that the fibre may be split and prepared for use.

AUSTIN, EDWARD, of Pembroke-cottages, Caledonian-road, Middlesex, master mariner. *Improvements in surveying and raising sunken vessels, and in apparatus used therein, and in lifting vessels over bars and other obstructions.* Patent dated October 26, 1853. (No. 2469.)

This invention consists mainly in the application to a submerged ship of a chain or belt, having a series of buoys attached to it at suitable intervals. The chain being drawn close round the vessel, and the length of buoy ropes proportionate to the depth of water, the position of the several buoys on the surface of the water will indicate the figure, size, and position of the vessel.

WOODWARD, GEORGE GOWER, of Lessnells, near Kidderminster, Worcester. *Improvements in the manufacture of carpets.* Patent dated October 26, 1853. (No. 2470).

Claims.—1. Combining self and parti-coloured warps for making carpets and other similar fabrics. 2. Dyeing or printing these parti-coloured warps in various colours of different shades, as distinguished from the ordinary mottled carpeting, known as "Albert-carpeting" or "spoiled tapestry-warps." 3. The application of the patent or ordinary flax-cotton, or of worsted or woollen-warps, in the manufacture of any make of piled or figured carpeting.

HEYWORTH, RICHARD, of Cross-hall, near Chorley, Lancaster, manufacturer, and THOMAS BATTERSBY, of Cross-hall aforesaid overlooker. *Certain improvements in looms for weaving.* Patent dated October 26, 1853. (No. 2471).

This invention consists in substituting a combination of parts for the springs usually employed for acting on the swells, by which the shuttle is held in the shuttle-box.

HUGHES, EDWARD JOSEPH, of Manchester, Lancaster. *Improvements in machinery or apparatus for sewing or stitching.* Patent dated October 26, 1853. (No. 2473).

The principal features of this invention are the use of two straight needles, working diagonally, and the use of a straight needle, working vertically, with a hooked guide acting upon the thread or threads horizontally.

EDWARDS, DOWNES, of Ravenscliffe, Douglas, Isle of Man. *Improvements in signal apparatus for railways.* Patent dated October 26, 1853. (No. 2475).

This invention consists of a combination of apparatus, whereby quantities of water are allowed to flow on the passing of a train, and by flowing cause signals to be set and unset.

O'NEILL, PATRICK BENGNUS, of Rue Miromenil, Paris. *Improvements in screw-wrenches.* (A communication.) Patent dated October 26, 1853. (No. 2476).

This invention consists of a peculiar construction and combination of parts, by which the jaws of a screw-wrench may be moved to and from each other with great facility, and from time to time be set at the desired distance apart.

DUNN, THOMAS, of Windsor Bridge Iron-works, Pendleton, near Manchester, Lancaster, engineer, and WILLIAM GOUGH, of Old Compton-street, Soho, London, Middlesex, engineer. *Improvements in the manufacture of veneers, and in machinery and apparatus connected therewith.* Patent dated October 26, 1853. (No. 2480.)

This invention consists in submitting portions of wood to the action of steam in a close vessel before they are cut into veneers, by a slicing-knife of the ordinary description.

VIZETELLY, JAMES THOMAS GEORGE, of Peterborough-court, London, engraver and printer. *Improvements in producing plates for printing purposes, by which the manipulatory process of engraving is superseded.* (Partly a communication.) Patent dated October 26, 1853. (No. 2481.)

Claims.—1. The converting of transfers of all kinds of engravings into printing surfaces, etched in relief, or sunk on metal plates, which are effective substitutes for relief, or sunk engravings, produced by the usual manipulatory process. 2. The production of such printing surfaces, either with or without the accompaniment of type text, or any other description of lettering. 3. The production of these substitutes for engravings, on plane, curved, or cylindrical surfaces.

REMOND, AMEDEE FRANÇOIS, of Birmingham, Warwick, gentleman. *Improvements in the manufacture of certain kinds of metallic vessels.* Patent dated October 27, 1853. (No. 2482.)

In carrying out his invention the patentee forms the body of the bottle of a sheet of iron rolled up into a cylindrical form, the edges of which are joined by welding. He then welds upon this hollow cylinder a top and a bottom, conducting these processes by means of certain described machinery.

DERING, GEORGE EDWARD, of Lockleys, Hertford. *Improvements in galvanic batteries.* Patent dated October 27, 1853. (No. 2486.)

Claims.—1. The use of acid solutions in contact with the negative elements of batteries, having any suitable exciting liquids, and composed of free mineral acids applied to their positive elements. 2. The application of porous divisions of earthenware, or other material, to troughs, or cells, or vessels, wholly or partly constructed of gutta percha or India-rubber, or like materials, or compounds containing such materials. 3. The use of lead as a negative element, with any suitable positive element, and any suitable exciting liquid or liquids in batteries for working electric telegraphs or clocks. 4. The use of iron, as a positive element, with any suitable negative element, and any

suitable exciting liquid or liquids in batteries, for working electric telegraphs or clocks. 5. The rendering air-tight, by any suitable means, batteries employed for working electric telegraphs.

VAUGHAN, WILLIAM, of Stockport, Chester, gentleman, JOHN SCATTERGOOD, of Heaton Norris, Lancaster, machinist, and CHARLES GRIMSHAW, of Brinnington, Chester, manager. *Certain improvements in healds or harness for weaving, and in the method and machinery or apparatus for fabricating the same.* Patent dated October 27, 1853. (No. 2487.)

The principal feature of this invention consists in a mode of inserting eyes in the process of forming the links, by previously stringing them on the yarn, and transferring them successively to a flat wire or bar.

GURNEY, JOSEPH, of St. James's-street, Westminster, tailor. *An improved mode of treating waterproof fabrics.* Patent dated October 27, 1853. (No. 2493.)

The inventor proposes to remove unpleasant odours from waterproof fabrics by steeping them in hot or warm water, and afterwards submitting them to a dry heat, for the purpose of evaporating the moisture which they have taken up. When operating upon thin piece goods, he steeps them for from one to two hours, or for as long as will suffice to saturate the fabrics with water; he then removes them to a heated chamber, or passes them under heated rollers.

*** A petition has been presented to the Lord-Chancellor for an extension of the time for filing the Specification of No. 2457, the plea of the petition being that the Specification was delayed by the late gales in the Channel.

The documents of Nos. 2416, 2474, are still with the Law Officers under objection.

No. 2422 has not yet been allowed.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

LITTLE, WILLIAM, of the Strand, Middlesex. *Improvements in typographic printing.* Application dated October 19, 1853. (No. 2413.)

This invention relates to cylinder printing, and in it each type and space is formed with two inclined sides and two parallel sides, in such manner that the columns of type, when set up, are placed around the cylinder and not longitudinally.

BURNEY, JOHN BEASLEY, of Battersea, Surrey, Superintendent of the City Steamboat Company. *Improvements in the prevention of smoke in steam boilers.* Application dated October 20, 1853. (No. 2424.)

This invention consists in arranging the fire-holes of the furnace below the crown, thus allowing a larger fire-box behind.

GOURGAS, GUSTAVE, of Paris, France. *Improvements in buffer, traction, or suspension springs for railway carriages, trucks, tenders, or locomotives.* Application dated October 20, 1853. (No. 2425.)

M. Gourgas's spring is composed of one or more blades of spring steel, and rests upon or against two fulcrums, as described.

WOOFENDEN, JONATHAN, of Belfast, Antrim, Ireland, engineer. *Improvements in power-looms for weaving.* Application dated October 20, 1853. (No. 2428.)

This invention consists in so arranging the details of the loom that the fabric, as woven, may be taken up or wound upon its beam in an exact quantity, at each throw of the shuttle, in proportion to the number of weft-shots being used; also, by the introduction of connecting-rods between the cranks and lathe of the loom, in giving ease in working; in using an elastic medium in the shedding-levers or heddle actuating apparatus and the heddles themselves; and in giving an elastic action to the wiper or cam of the picking motion.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the treatment or manufacture of gutta percha, and in the application thereof.* (A communication.) Application dated October 21, 1853. (No. 2430.)

In carrying out this invention, the raw material is purified by being passed through a mill having indentations or teeth formed within a fixed chamber, and similar indentations on the surface of a revolving cone working inside it; after passing between the surfaces, the gutta percha falls on to toothed rollers, beneath and between which it is drawn by their revolution. By this means it is pressed and freed from foreign matter.

CROSS, CHRISTOPHER, of Farnworth, Lancaster, manufacturer, and JAMES CROSBY, of Manchester, same county, manufacturer. *Improvements in machinery or apparatus for weaving.* Application dated October 21, 1853. (No. 2431.)

This invention consists in an apparatus by which the shuttle is caused to travel in a circular direction. The dents of the reeds are arranged radially, and the warp threads pass through them in a circular direction, or in the directions of the sides of a polygon; the shuttle is placed upon the dents, and is caused, when motion is communicated to them, to carry forward the weft between the warp threads, a shed being formed according to the description of work to be produced.

MARSHALL, JAMES GARTH, flax spinner, and PETER FAIRBAIRN, machinist, both of

Leeds, York. *Improvements in machinery for combing flax, tow, wool, and other fibrous substances.* Application dated October 21, 1853. (No. 2432.)

This invention relates to machines patented by the inventors, February 25, 1846, and consists—1. In adapting parts thereto, whereby they are enabled to combine several of the said machines in one framework, and thus cause the whole to act simultaneously. And, 2. In a peculiar method of driving the feeding rollers by means of a rocking motion, whereby the rollers are made to rotate at intervals for the purpose of delivering the sliver at each return of the rotating combs.

Cook, Henry, of Devonshire-terrace, Middlesex, artist, and Augustus Cook, of Upper Berkeley-street, in the same county, surgeon-dentist. *Improvements in the means of communication between guards, engine-drivers, or passengers, in or on railway trains.* Application dated October 21, 1853. (No. 2439.)

The inventors propose to provide each vehicle with a length of India-rubber tubing, through which messages may be transmitted without any interior obstruction.

Mermet, Jean François, of Red Lion-street, Holborn. *An elastic spring contained in a cylindric tube or tubular case, the lid of which moves down and up according to the pression.* Application dated October 22, 1853. (No. 2443.)

This spring (which the title describes sufficiently) is to be used in the inside trimming of common carriages, railway carriages, boats, and ships' cabins of every description. It is also to be applied to pieces of furniture, such as covered benches, sofas, arm-chairs, mattresses.

Connell, Thomas, of Cork, solicitor. *An improved safety apparatus or method or means of signalling, to be used on railways in case of danger or emergency.* Application dated October 22, 1853. (No. 2444.)

This invention consists of a contrivance which will act upon a lever or other instrument attached to the engine, so as to actuate a signal upon it, and may also act upon the steam valve, so as to shut off the steam.

Walker, Thomas, of Pimlico, Middlesex, engineer. *An improved railway break.* Application dated October 22, 1853. (No. 2445.)

The inventor employs a break that is to be carried out from the station and placed upon the rail in order to skid or lock the front and driving wheels of the engine or leading carriage of the coming train.

Greenfield, Hume, of Old Cavendish-street, Middlesex, gentleman. *Improvements in obtaining power by carbonic acid gas.* (A communication.) Application dated October 22, 1853. (No. 2446.)

This invention consists of improvements in the apparatus employed when using liquified carbonic-acid gas as a means of obtaining power.

Hett, Alexander, of Stoke Newington, Middlesex. *Certain improved means or arrangements for the prevention of smoke and the economising of fuel in furnaces.* Application dated October 24, 1853. (No. 2453.)

The distinctive principle of this invention is, that of driving water (by means of a blast of air admitted into the ash pit) between the fire-bars of a furnace amongst the fuel, and at the same time admitting air over the fuel through the furnace door or through a suitable opening made for that purpose.

Blunt, Charles Fly, of Montague-place, Russell-square, Middlesex. *An improved artificial coal fuel, which he desires to denominate "Blunt's diamond coal-fuel."* Application dated October 24, 1853. (No. 2454.)

The inventor says of his fuel, "that being composed of studied and suitable combustible substances, properly and scientifically combined, such composition is moulded into such regular forms, as, with their modifications, ensures use and application thereof, a self-acting admission of atmospheric air, with its constituents as an element of combustion, and a regulator of the process of such combustion."

Palmer, Christopher Richard Norris, of Amwell, Hertford, Esq. *An improved mode and apparatus for preventing accidents on railways (including improvements in signalising apparatus.)* Application dated October 25, 1853. (No. 2456.)

The inventor works certain apparatus consisting of cylinders, pistons, and tubes, by means of liquids or elastic fluids, in a manner somewhat similar to that described in the inventor's specification of a former patent.

Bogue, David, of Fleet-street, London, publisher. *An improved mode of producing printing surfaces.* (A communication.) Application dated October 25, 1853. (No. 2464.)

The patentee first prepares a polished plate of copper, zinc, steel, or other suitable metal, and transfers to it, by the application of pressure, the drawing or print which is required to be reproduced, enabling the plate to resist the action of corrosive acids at those parts of its surface which correspond to and lie under the lines, letters, or marks of the transfer. He next submits the plate to the action of dilute nitric or other suitable acid. The corroding action is allowed to proceed until the level of the exposed surface is sufficiently re-

duced to admit of the plate (when the transfer is cleaned off) being printed from, like a wood engraving.

Palmer, George Holworthy, of Sheffield, York, civil engineer. *Improvements in the construction of air-furnaces for the fusion of steel and other metals, and for economizing fuel.* Application dated October 26, 1853. (No. 2472.)

The chief features of this invention are —1. An arrangement of the crucibles so that they are heated to the necessary temperature without surrounding them with the incandescent fuel; and 2. The use of certain radial flues and damper bricks for regulating the draught and equalizing the heat acting upon each and all of the crucibles.

Danchell, Freiderich Ludewig Hahn, of Elm-grove-villas, Acton-green, Middlesex, engineer, and William Startin, of Heathfield-terrace, Turnham-green, engineer. *Improvements in obtaining and applying motive power.* Application dated October 26, 1853. (No. 2477.)

This invention consists, firstly, in obtaining motive power by creating a current within a tube or series of tubes joined together; and, secondly, in applying such current for imparting motion to a body or bodies placed within the tube or tubes.

Lane, Uriah, of North-street, Brighton, Sussex. *Improvements in measuring and indicating time.* Application dated October 26, 1853. (No. 2478.)

The inventor employs a glass tube containing water or spirit and a small quantity of air, and suspends it by a pinattached to it in a horizontal position, so that the air bubble will remain quiescent; the tube is then moved out of the horizontal position, and time is measured by the space over which the bubble passes, which will vary with the angle of inclination of the tube.

Joly, Romain, of Gaillon, France, colorist. *Improvements in dyeing.* Application dated October 26, 1853. (No. 2479.)

This invention consists in a mode of fixing, by means of copper and bichromate of potass, the colouring matter extracted from dye woods, and in causing the colouring matter when applied to wool, silk, or other fibrous substances, to become permanent.

Blackwell, Thomas Seal, of Cranbrook, Kent, surgeon. *Improvements in apparatus for signalizing and stopping railway-trains.* Application dated October 27, 1853. (No. 2483).

The inventor describes—1. A peculiar arrangement of signal sounds, colours, and lights. 2. A certain arrangement of signal rods, wires, slide-pieces, and chains. 3. A shoe-brake, thrown into and out of action by means of a piston.

Richards, Richard, of Paddington, Middlesex, merchant. *Improvements in apparatus for indicating water in the holds of vessels.* Application dated October 27, 1853. (No. 2484).

This invention consists in a mode of indicating the height of water in the holds of vessels, by placing in it a floating body connected with a suitable index.

Dawson, Thomas, of King's-arms-yard, London, mechanician. *An improved case or cover for umbrellas, which can also be worn as a garment.* Application dated October 27, 1853. (No. 2485).

This invention consists in covering umbrella-frames with a light waterproof fabric, the edges of which are united by a solution of caoutchouc or other like solution, the ends being fastened to the ribs by eyelets.

Bishop, Robert, of Edinburgh. *Improvements in steam and water-valves.* Application dated October 27, 1853. (No. 2488).

This invention consists in a method of controlling the passage of fluids more effectually than ordinarily, by means of peculiar arrangements of cocks and valves.

Dolby, Henry, of Regent-street, Middlesex, heraldic stationer. *Improvements in embossing-presses.* Application dated October 27, 1853. (No. 2489.)

This invention consists of a hand-press in which the impression is produced by a sharp blow instead of a gradually increasing pressure.

PROVISIONAL PROTECTIONS.

Dated March 4, 1854.

527. Charles De Bergue, of Dowgate-hill, London, engineer. Improvements in apparatus for bearing and buffing purposes.

Dated March 8, 1854.

549. James Charles Edington, of Leicester-square, Middlesex. Working machinery propelling vessels and firing guns.

Dated March 29, 1854.

722. Charles Barlow, of Chancery-lane, London. Certain improvements in the permanent way of railways. A communication.

Dated April 1, 1854.

751. William Johnson, of Lincoln's-inn-fields, Middlesex, civil engineer. Improvements in the treatment or reduction of metallic ores and salts. A communication.

Dated April 6, 1854.

803. William Richards, of Barcelona, Spain, engineer to the gas-works. Improvements in wet gas-meters.

Dated April 7, 1854.

807. Frederick Robert Augustus Glover, of Bury-street, Westminster, master of arts. Improvements in two-wheeled carriages.

Dated April 18, 1854.

888. Samuel James Healey, of Over Darwen, near Blackburn, Lancaster, machinist. Improvements in apparatus applicable to steam boilers for preventing explosions and saving fuel.

890. Julian Bernard, of Club-chambers, Regent-street, Middlesex, gentleman. Improvements in the manufacture of boots and shoes, and in the machinery or apparatus connected therewith.

894. Henry Hucks Gibbs, of Bishopsgate-street, London. Improvements in the manufacture of nitrate of soda. A communication from Pedro Gamboni.

896. William Denton, of Addingham, York, machine wool-comber. Improvements in combing wool and other fibres.

Dated April 19, 1854.

898. Jean Daniel Pfeiffer, of Paris, Rue Princesse. Improvements in bookbinding.

899. Moses Poole, of the Avenue-road, Regent's-park, Middlesex. Improvements in drying and weighing fibrous and other substances. A communication.

900. John Kirkham, of Tonbridge-place, Middlesex, civil engineer. Improved means of consuming smoke in furnaces.

901. John Coope Haddan, of Chelsea, Middlesex, civil engineer. Improvements in adhesive stamps and labels.

902. John Jeyes, of Northampton, merchant. Improvements in the manufacture of pulp suitable for paper-making.

903. Jeremiah Briggs, of Derby, gentleman. A means of communicating intelligence from one part of a railway train to another, and from one place to another.

904. Henry Clarke, of Lincoln, manufacturer. Improvements in cannons, guns, and other fire-arms.

Dated April 20, 1854.

906. Thomas Vickers, of Manchester, Lancaster, bone-merchant. Improvements in the manufacture of manure.

907. Edmund Hunt, of Walcot-square, Kennington-road, Surrey, chemist. Improvements in treating minerals for the extraction of their valuable metals.

908. Robert Richardson, of Great George-street, Westminster, Middlesex, civil engineer. An improved method of joining or securing the joints of pipes.

909. John Pym, of Bangor, Carnarvon, engineer. Improvements in the manufacture of pipes for the transmission of water and other fluids.

910. Henry Brown, of Halifax, York, top-maker. Improvements in combing wool, hair, cotton, and other fibrous materials.

911. John Montgomery Reed, of Northumberland-street, Strand, Middlesex. Improvements in the treatment of amalgams.

912. George Jones, of Spring Vale Ironworks, Sedgley, Stafford, ironmaster. Improvements in landing-apparatus to be used in working mines.

913. William Johnson, of Lincoln's-inn-fields, Middlesex, civil engineer. Improvements in machinery or apparatus for making bricks or tiles. A communication from Malgoire Augustin Julienne, of Paris, France, mechanical engineer.

914. William Johnson, of Lincoln's-inn-fields, Middlesex, civil engineer. An improved apparatus for discovering the leakage or escape of gas. A communication from Etienne Abram Maccaud, of Paris, France, gentleman.

Dated April 21, 1854.

915. Thomas Wood, of Culcheth, Lancaster, engineer, and Samuel Howard Heginbottom, of the same place, bleacher and dyer. Improvements in metallic pistons for steam engines and pumps.

916. Frederick Buonaparte Anderson, of Gravesend, Kent, optician. An improvement in spectacles and eye-glasses.

917. Richard Jex Crickmer and Frederick William Crickmer, of Bermondsey, Surrey, engineers. Improvements in cannons and field-pieces.

918. Charles Cammell, of Cyclops Steel-works, Sheffield, York, steel-manufacturer. Improvements in the permanent way of railways.

919. Robert Hanham Collyer, of Norfolk-street, Strand, Middlesex, doctor of medicine. Improved machinery for crushing or triturating hard substances.

920. William Harcourt and Joseph Harcourt, of Birmingham, Warwick, brass-founders. Improvements in chamber or flat-bottomed candlesticks.

921. Samuel Minshull, bronzist, and Charles Austin, land-agent, both of Birmingham, Warwick. Improvements in securing and fastening the lids of boxes or cases used for packing manufactured or other goods.

922. William Britton Stephens, of Mark-lane, London, merchant. Improvements in lamps. A communication.

Dated April 22, 1854.

924. Henry Bernoulli Barlow, of Manchester. Improvements in manufacturing metal nuts, and in machinery for stamping, forging, and punching the same. A communication.

925. Pierre Jean Felix Mouchell, manufacturer, of Paris, France. Certain improvements in melting and in treating the ores and metals.

926. John Harlow, of Moseley, Worcester, printer. Improvements in the manufacture of paper, pasteboard, and millboard.

927. Thomas Freman Finch, of Lidbury-street, Worcester. Improvements in the manufacture of buttons.

928. Joseph Gill, of Marsala, in the kingdom of the Two Sicilies, merchant. Improvements in apparatus for the distillation of spirituous liquors.

929. Robert Galloway, of Lambeth, Surrey, engineer. Improvements in the construction of furnaces.

930. William Goodchap, of Walbrook-house, Walbrook, London, accountant. Improvements in obtaining power by carbonic acid gas. A communication from Hume Greenfield, of New Orleans.

931. James Warren, of Old Broad-street, London. Improvements in the construction of railways.

Dated April 24, 1854.

932. Charles Emilius Blank, of Trump-street, London, merchant. Improvements in winding or reeling yarn into hanks. A communication.

934. Charles Hart, of the Vale of White Horse Ironworks, Wantage, Berkshire, agricultural engineer. An improvement in the mode of applying power to combined threshing and dressing-machines.

936. John Wilson, of Croydon, Surrey, gentleman. Improvements in the construction of portable houses and other buildings.

938. James Combe, of Belfast, Antrim, Ireland, machine-maker. Improvements in machinery for hackling flax and other fibrous substances.

Dated April 25, 1854.

944. Frederich Ludewig Hahn Danchell, of Acton, Middlesex, engineer. Improvements in obtaining and applying motive power.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," May 5th, 1854.)

2778. James Lord. Improvements in the manufacture of certain articles for ladies' under clothing, and in fabrics for the same.

2845. William Bridges Adams. Improvements in railway wheels, their axles, and boxes.

(From the "London Gazette," May 9th, 1854.)

2864. John Winspear. An improved mode of coating metals, wood, stone, and plaster, to preserve them from decay.

2881. John Henry Johnson. Improvements in furnaces for the manufacture of steel. A communication.

2904. William Beckett Johnson. Improvements in machinery or apparatus for making bricks and other articles from clay and other plastic materials.

2982. John Gillow, junior. Certain improvements in the manufacture of salt.

3030. John Milner. Improvements in connecting the rails of railways.

3045. Stanislas Tranquile Modeste Sorel. Certain improved compositions to be employed as substitutes for caoutchouc, gutta percha, and certain fatty bodies.

3. Alfred Dawson. Converting small coal or coal-dust, or small coal and coke into solid blocks of fuel.

4. James Gowans. Improvements in apparatus for heating and ventilating, and in baths and washing-apparatus connected therewith, applicable to dwelling-houses.

6. Peter Armand Lecomte de Fontainemoreau. Improvements in dyeing wool. A communication.

24. John Henry Johnson. Improvements in ventilating carriages and buildings, part or parts of such improvements being applicable to the obtainment of motive power. A communication from John Chilcott and George T. Palmer, of Brooklyn, New York, United States of America.

26. Léon Joseph Pomme. Certain improvements in reducing the friction of axles and axletrees of carriages.

44. Henry Sutherland Edwards. Improvements in preparing textile fabrics or materials for the purpose of their better retaining colours applied to them. A communication.

48. Richard Husband. Certain improvements in the method of ventilating hats or other coverings for the head.

49. William Garforth and James Garforth. Certain improvements in mechanism or apparatus for retarding or stopping the motion of locomotive engines and other railway carriages.

69. Ralph Lister. Improvements in distilling-apparatus.

89. Patrick O'Malley. The manufacture of a new drink, or beverage from certain vegetable and other substances, and the conversion thereof into vinegar.

199. George Firmin. Improvements in anchors.

282. Edwards Cole. An improvement in the frames of travelling-bags.

314. James Samuel and Alexander Woodlands Makinson. Improvements in drying flax, straw, and other fibrous substances.

325. Benjamin Hornbuckle Hine, Anthony John Mundella, and Luke Barton. Improvements in the manufacture of knitted fabrics.

750. Alfred Vincent Newton. Certain improvements in sewing-machinery. A communication.

832. William Crofton Moat. A machine for crushing, pulverising, and amalgamating.

841. William Lewis Baker. Improvements in clock, tower, turret, and other like bells.

843. Zachariah Round. An improvement or improvements in bricks to be used in certain parts of buildings.

876. Peter Armand Lecomte de Fontainemoreau. Improvements in priming fire-arms. A communication.

887. Charles Chapel Davis. Improvements in portable blow-pipe apparatus.

908. Robert Richardson. An improved method of joining or securing the joints of pipes.

917. Richard Jex Crickmer and Frederick William Crickmer. Improvements in cannons and field-pieces.

934. Charles Hart. An improvement in the mode of applying power to combined threshing and dressing-machines.

NOTICE OF APPLICATION FOR PROLONGATION OF PATENT.

A petition will be presented to Her Majesty in Council by William Ryder, of Bolton, in the County of Lancaster, roller and spindle-maker, praying Her Majesty to grant a prolongation of the term of the letters patent granted to the said William Ryder, dated 8th February, 1841, for "certain improved apparatus for forging, drawing, moulding, or forming spindles, rollers, bolts, and various other like articles in metal." On the 14th June an application will be made to the Judicial Committee of Her Majesty's Privy Council to fix an early day for the hearing of the matters contained in the said petition; and any person desirous of being heard in opposition must enter a caveat to that effect in the Privy Council-office on or before that date.

WEEKLY LIST OF PATENTS.

Sealed May 5, 1854.

2569. John Smith.
2572. John Hyde.
2574. Robert William Jearrad.
2577. William Beckett Johnson.
2583. Jonathan Grindrod and Alexander Hunter.
2584. Henry Wiglesworth.
2585. Robert Roughton.
2586. Thomas Walker.
2594. John Henry Johnson.
2676. Thomas Holmes.
2689. Auguste Castets.
2754. Emmanuel Barthélemy, Tony Petitjean, and Jean Pierre Bourquin.
2768. Prix Charles Jean Baptiste Sochet.
2802. Auguste Edouard Loradoux Bellford.
2910. Auguste Edouard Loradoux Bellford.
2942. John Greenwood.
3010. Francis Parker.

1854.

232. Edward William Kemble Turner.
317. Farnham Maxwell Lyte.
375. John Davie Morries Stirling.
402. James Beall.
430. James de Wolfe Spurr.
472. John Davie Morries Stirling.
487. James Medwin.

506. Thomas Metcalfe.
522. Caleb Bloomer.
544. William Clay.
548. Henry Bernoulli Barlow.

Sealed May 9, 1854.

2598. Jerome André Drieu.
2610. Edward Gregson Banner.
2614. William Steel.
2619. James Hill Dickson.
2623. François Amand Délande.
2655. John Henry Johnson.
2663. George Dugmore and George Hayward Millward.
2698. Walter Henry Tucker and William Rashleigh Reeves.
2767. John Walmsley and John Ingham.
2955. James Hunter Campbell.

1854.

303. Alfred Vincent Newton.
357. Thomas Irving.
595. John Henry Johnson.
621. John Houston, junior.
634. James Garth Marshall and Peter Fairbairn.

NOTICES TO CORRESPONDENTS.

G. A. C.—We do not know of any cheaper processes than those you mention. The Editors of the "Chemist" might probably furnish you with the information.

Investigator.—Yours will be inserted as soon as is convenient.

Erratum.—No. 1604, page 411, 13th line, *for* left, *read* right.

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CHESTERMAN'S PATENT IMPROVEMENTS IN TEMPERING, GRINDING, ETC., STEEL AND OTHER METALS.

Fig. 2. Fig. 3.

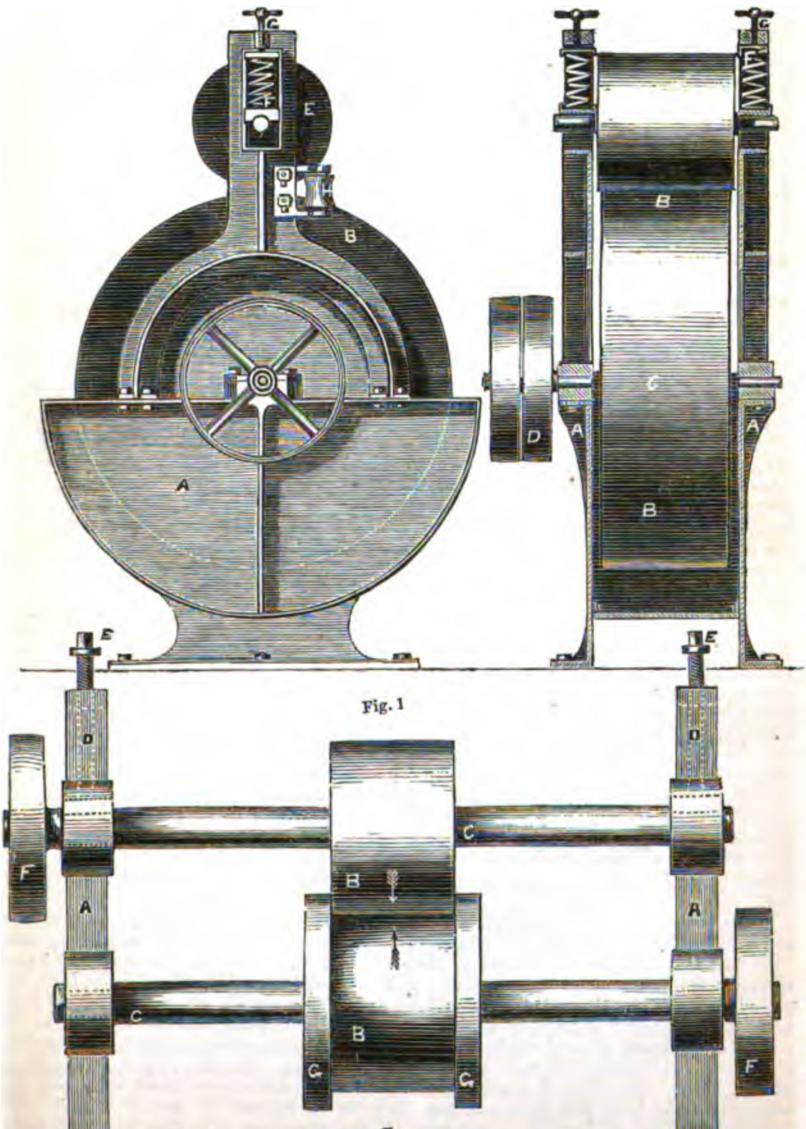


Fig. 1

CHESTERMAN'S PATENT IMPROVEMENTS IN TEMPERING, GRINDING, ETC., STEEL AND OTHER METALS.

(Patent dated November 1, 1853.)

Mr. Chesterman, of Sheffield, has lately invented and patented several valuable improvements in hardening and tempering steel, and in grinding, glazing, buffing, and brushing steel and other metallic articles. The processes of hardening and tempering apply principally to thin steel, such as is used for saw-blades, for example. The hardening is effected in the following manner:—The inventor takes a strip, say from ten to thirty feet long, and winds it into a circular cast-iron case of about the same depth as the width of the steel. In the side of the case is a gate or aperture, through which a small portion of the outer coil of the steel is made to protrude. He then puts a cast metal lid on the top of the case, so as to cover the whole of the steel, and places the case in a furnace, and allows it to get red-hot, when it is removed by one workman, while another seizes hold of the protruding end of the steel, and draws it through a pair of cold steel, metal, or stone dies or plates, by which the steel will be hardened, coming out flat. The dies or plates are to be kept cold by having cold water applied to them, or they may be made hollow, and a stream of water be caused to flow through them. Shorter and stronger lengths, such as steel saw-blades, &c., are hardened by placing them in a furnace and allowing them to get red-hot, and then quickly introducing them and subjecting them to pressure between two dies or plates, mounted in a frame so as to form a press, by which means they are both hardened and prevented from warping or buckling—care being again taken to keep the dies or plates, whether of metal or stone, cold by the application of water. He tempers these articles in the ordinary manner, and the tapes or strips as follows:—After the strip or length of steel has passed through the dies or plates, it is removed to a stretching-table, where one end is made fast between screw-clamps or otherwise, while the other end is clipped between another pair of screw-clamps attached to a leather strap, which is fastened to a drum or roller turning in bearings, and furnished with a lever or arm, which is weighted so as to produce a gentle strain on the steel. The steel is then oiled or greased, and heat is applied to it from a portable furnace or gas-light attached to a flexible tube, or from any other source, so as to blaze off the oil or grease, whereby a fine spring temper will be imparted to the article operated on, and it will be left flat and straight. Or a fixed gas-furnace is employed, and the steel drawn from the hardening dies or plates direct through the gas-furnace, thus becoming hardened and tempered at one continuous operation.

For the purpose of grinding both sides of a flat article, or the entire periphery of a circular or similarly-shaped article, the inventor fixes upon a central tube or axis a grindstone in the form of a roller or cylinder, and makes this stone plain or indented with semicircular or other grooves, according to the shape of the article to be ground; and over this grindstone roller he mounts another similar to it. Upon rotary motion being imparted to the rollers, and the end of the article to be ground being inserted between them, they will draw it through, but without grinding it; the article is then to be drawn or pushed by the workman in a contrary direction to the rotation of the rollers, and the grinding will then take place in its passage between them. The sides of one of the rollers, when the articles to be ground are flat, are also provided with collars formed of grindstone, and of a larger diameter than that of the rollers, whereby the edges, as well as the sides of the metal article, may be ground, where requisite, at the same operation. Means are provided for adjusting these rollers to suit the thickness of the articles to be ground, and also for adjusting the stones on the central tube or axis. For the purpose of grinding one side only of a steel or metal article at a time, a plain wooden roller is substituted for one of the grindstone rollers; and combined with this arrangement are guide-rollers for cross grinding.

These improvements in grinding will be found of especial advantage in the case of saw-grinders, who, as a body, are subject to severe diseases of the chest and lungs, called "the Grinder's Complaint," caused by their standing or sitting over the stone. To such an extent is this complaint prevalent, that it is no uncommon thing for persons thus employed to become incapacitated from following their occupation at a comparatively early age. By the present improvements this evil will be in a great measure obviated, as the men will be enabled to grind articles at a considerable distance from the stone, and in front of it instead of leaning over it, as is the common practice. Another important consideration is, that in the event of a grindstone flying to pieces—by no means an uncommon occurrence—the men will be much less likely to be injured, or perhaps killed, while standing at a distance from the stone, than if they were over it, as they would be under the ordinary system.

To glaze, buff, and brush blades of steel and other metal articles, the inventor uses two similar rollers, formed of soft wood with emery on the surface, or of buff leather, or bristles, or partly of buff and partly of bristles; or they are made with surfaces similar to those ordinarily employed for glazing, buffing, and brushing.

Fig. 1 of the accompanying engravings represents a front view of a machine for grinding flat surfaces constructed according to Mr. Chesterman's improvements. A A is the framing; B B, the grindstones; and C C, their axes, which turn in bearings in slots formed in the end standards of the framing. D D are springs, and E E set screws, by which the pressure of the rollers against an article introduced between them is regulated. F F are pulleys to receive the straps by which the grindstones are driven. G G are collars of grindstone for operating on the edges of the article. A pair of grooved rollers is to be used for grinding tubes and other articles of circular section. These rollers are mounted and worked in the same manner as the rollers B B, in fig. 1.

Fig. 2 is a side elevation, and fig. 3 a vertical section of a grinding-machine for operating on one side only of a flat article. A A is the frame in which the grindstone is supported; B is the grindstone; C, the axis on which it is mounted, and D the pulley by which it is driven; E is a wooden roller revolving in contact with it, and F G springs and set screws by which the pressure of E against the grindstone is regulated. H is one of a pair of friction-rollers fitted on either side of the grindstone, for the purpose of giving support to articles requiring to be cross ground, and holding them in contact with the stone. Brushes, buff-rollers, and glazers of the descriptions before mentioned may be substituted for the grindstone rollers in fig. 1.

ON THE MECHANICAL PRINCIPLES OF SHIP-LAUNCHING.

A few of the mechanical principles involved in launching ships may, perhaps, prove interesting to many of our readers,—to the professional as well as the non-professional. There is, probably, no other operation performed by the mechanic which creates, and is worthy of, so great and so general an interest as this.

To the consummation of what other mechanical art and labour will so many thousands of eager spectators hasten as were present at the launch of the *Royal Albert*, on Saturday last? In the present state of affairs, the launch of so magnificent a structure is quite a national *fête*—rendered especially so in the present instance by Her Majesty herself taking part in it. These considerations are sufficient to assure us that a statement (clear as we can make it) of the laws which govern the motion of the ship, from the position in which she has been built, into the water which receives and sustains her so gracefully, and some of the conditions necessary to the success of the launch of a large ship, will—though not of a very profound character—be worth presenting to our readers.

On each side of a vessel to be launched is constructed an inclined plane, called a sliding-way, the upper surface of which is formed of oak planking. These ways are extended to a length sufficient to afford support to the ship till she is so far immersed as to be sustained by her own buoyancy. On each of these is placed one of two assemblages of timber, called the "bilgeways," which are of the form of square prisms, whose lengths are about seven-eighths that of the ship. They are formed of square pieces of fir scarphed together endwise, and planked with oak on the bottom or sole, and also on the two sides. These are placed parallel to the middle line of the keel, and so that the distance from the side of the keel to their outer surfaces shall be equal to one-sixth of the greatest breadth of the vessel. Upon these bilgeways the ship is supported by means of pieces of fir placed with their lengths in the direction of the ways in midships, where it is possible to make them fill up in that way; and on their ends, forward and aft. The former are called stopping-up pieces, the latter poppets. The whole of this, including the bilgeways, forms what is called the cradle, and serves to convey the ship down the sliding ways (in the same way as a skater might descend on his skates down an incline of ice), and, for all investigations of the conditions of launching, may be regarded as rigidly connected with, and forming part of, the ship. This, we think, will be found a sufficient description of the details of the launch to render intelligible the terms which we shall find it needful to use as we proceed.

The following particulars are what we think it important to discuss:

I.—The transverse stability of the ship on the ways, before launching.

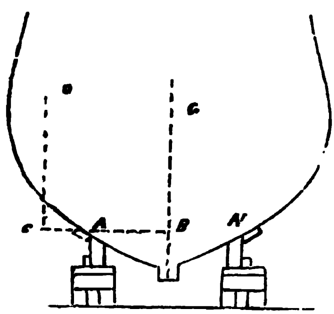
II.—The forces that tend to set the ship in motion, or to prevent her motion down the inclined planes.

III.—The forces that tend to produce motion in a direction at right angles to the slideways.

IV.—The conditions which should determine the extent of the slideways, in order that the ship may be sustained till she becomes sufficiently immersed in the water to be supported by her own buoyancy.

I. The distance between the outsides of the bilgeways being but the breadth of the keel, more than one-third the greatest breadth of the ship, it might perhaps be thought that no very great force would be needful to overturn her. To convey some clear notion of this matter, we will attempt to explain some of the circumstances which would influence the choice of the lateral position of the bilgeways, supposing such a choice to have to be made without any reference to what experience has taught us.

Fig. 1.



Let fig. 1 represent a section of the surface of the vessel, with the launch under her; the outsides of the ways being at A A^1. Suppose a force, P, tending to upset her, to act downwards in the vertical line, D C; and let G be the centre of gravity of the ship; G B a vertical line through it; C A D a horizontal line through A; W the weight of the ship. Then, in order that P may have any effect in overturning the ship, it must be greater than the value of that force given in the following equation:

$$P \times AC = W \times AB \quad . \quad . \quad . \quad (I.)$$

Now the greatest value that A C can have is that which it must receive when B C = the half of the ship's greatest breadth, or if A B be a third of that breadth, the greatest value of A C is twice A B. Therefore the least value of P in equation (I.) is half of W. And this, in the case of the *Royal Albert*, would not be a small matter; for the whole weight of her hull would, no doubt, be as much as 2,800 tons; so that the least vertical force which would be capable of turning her about the outer edge of her bilgeways must be greater than 1,400 tons. And if we suppose weights to be ranged along the decks on one side only, and at the distance of about 20 feet from the middle line, so that A C may be equal to A B, these weights must then have an amount equal to the whole weight of the ship, if they were to produce any effect in the form of a rotary motion; that is, they must amount to 2,800 tons in order to upset the ship. But it is evident that, if we increase the distance, A B, from the outside of the cradle to the middle line of the keel, in this respect the vessel would be still more safe; and, of course, it is desirable to make her safety as great as possible. But it will not do to regard the safety of the ship in this respect only; for it will readily be seen that the cradle will have a tendency to move out from under her, which has to be resisted by obstacles in the form of planks and cleats secured to her bottom: this tendency arising from the inclination of the ship's surface to the horizon at those parts against which the cradle presses. It is further evident that this tendency grows greater and greater as this inclination increases, so that if the ways were placed much farther apart, they could not be properly secured to the ship: and this is of especial importance in regard to the fore and after parts of the vessel where she is sharp, and where it is of great moment that she should be efficiently supported.

The French method of launching on the keel, and obtaining stability by the use of sideways constructed for that purpose, seems to satisfy these last conditions the most perfectly. But if we regard the ship as not a perfectly rigid body, but a somewhat flexible one, the English method will seem to have some advantage over the other, as there will be less tendency to strain when there are two lines of support, about which the inner and outer portions of the body will have a balancing influence upon one another. We learn from these difficulties the value of the experience which has taught us that all these conditions are satisfactorily fulfilled by making the distance between the outer surfaces of the bilgeways what we have before stated.

II. The forces that act upon the ship in, or opposed to the direction in which she is required to move are—first, the resolved part of gravity parallel to the incline, tending to produce motion down it; second, the friction between the surfaces in contact

tending to prevent or retard that motion. The resolved part of gravity efficient in the direction of the inclined plane is equal to the product of the weight of the ship and the sine of the angle of inclination of the sliding-ways to the horizon. Let P=this force, W weight of the ship, and a the angle; then

$$P = W \sin. a;$$

and putting $W = 2{,}800$ tons and $a = \sin.^{-1} \frac{1}{16}$ (since the declivity per foot is $\frac{3}{4}$ of an inch, or 1-16th of a foot)

$$P = \frac{2{,}800}{16} = 175 \text{ tons.}$$

Again the friction will be equal to the normal or perpendicular pressure between the surfaces of the sliding and bilgeways multiplied by the co-efficient of friction proper to them, or that ratio which the friction has been found to bear to the perpendicular pressure between such surfaces; this will give us, if we put F for the whole friction and f for the coefficient,

$$F = W f \cos. a.$$

Hence, assuming M = the resultant force down the incline

$$\begin{aligned} M &= P - F \\ &= W \sin. a - W f \cos. a \\ &= W \left\{ \sin. a - f \cos. a \right\} \ldots \text{(II.)} \end{aligned}$$

and putting

$$W = 2{,}800 \text{ tons}, \sin. a = \frac{1}{16}, f = \cdot 05$$

$$M = 2{,}800 \left\{ \frac{1}{16} - \frac{15 \cdot 9}{16} \times \cdot 05 \right\}$$

$$= 35 \cdot 875 \text{ tons.}$$

Here the coefficient of friction has been assumed to be that given by Professor Moseley for oak surfaces, with tallow as an unguent; it is probably too great, and the strain on the dog-shores and foremost blocks would, in that case, of course be more than is given above. The true coefficient of friction might be discovered by observing the time that the ship takes to traverse a portion of her course from starting. Let s be the space, and t the observed time corresponding, g the accelerating force of gravity; then we have the equation,

$$s = \frac{g}{2} \left\{ \sin. a - f \cos. a \right\} t^2$$

from which we may get

$$f = \left\{ \sin. a - \frac{2s}{g t^2} \right\} \sec. a.$$

Which is the coefficient of friction in terms of the observed time and space and the angular declivity of the slide.

These, then, are all the forces which act upon the ship before she takes the water; but when she descends into the fluid, the pressure on the slide is decreased, and the effective portion of it is also diminished; so that if w be the weight of the water displaced at any moment, then equation (II.) becomes

$$M = (W - w)(\sin. a - f \cos. a),$$

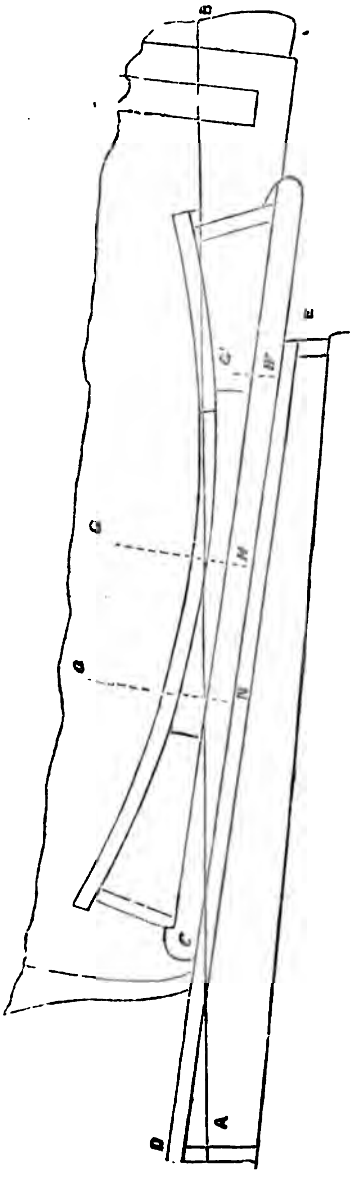
Besides this change there is also a resistance brought into play which tends to reduce the ship to the condition of the water itself—to bring her to rest, if the water be at rest, and to change her motion gradually to that of the stream, if there be any.

As a matter of fact, there is generally a tidal current more or less strong, which crosses the ways and impresses a lateral force on the ship when she enters the water, by which force her motion is gradually changed in magnitude and direction till it coincides in both respects with that of the tide, unless she be previously brought up by the use of her anchors and hawsers. No mathematical investigation of this problem of resistances can be given which will correspond in any considerable degree with the actual conditions of the motion of a ship when launched into still or moving water, we shall not therefore attempt to present any such to our readers, but shall pass to the third particular which we have to treat.

III. The forces which tend to produce motion in a direction perpendicular to that of the slideways are, the resolved portion of the gravity of the ship in this direction downwards, which may be regarded as a force acting through the centre of gravity of the vessel; the upward pressure of the ways, which may also be regarded as a single force acting through a single point, which is (as we shall show) determinable; and the resolved part of the upward pressure of the fluid, when the ship is partially immersed, which may be treated as a single force acting through the centre of gravity of the displaced fluid, its whole amount being equal to the weight of that fluid. We shall investigate the relations that must exist between these forces in order that they may be in equilibrium, that is, that there may be no motion of any kind in their direction; that the only motion may be that in the direction of the sliding-ways.

Let W be the weight of the ship; w the weight of the fluid displaced. P the resultant of all the pressures between the bilge and sliding-ways; G the centre of gravity of the ship (fig. 2) g' that of the fluid displaced; N Q the line of application of P, which is of course perpendicular to D E. Let G H and G′H′ be perpendiculars on D E; D E being the sliding-ways, C H′ the bilgeways. Now, resolving the forces parallel and perpendicular to

Fig. 2.



D E, and taking the equations of equilibrium of those perpendicular, we get

$$P = \left\{ W - w \right\} \cos. a,$$

and $P \times N H = w \times H H'$,

$$\text{or } N H = \frac{w \times H H'}{(W - w) \cos. a},$$

so that both P and its line of action can be ascertained for each position of the ship, if the weight and the position of her centre of gravity be known, for $w \times$ H H′ can be calculated if the position of H be assumed, H′ being readily found; and the term (W −)w cos. a is known if W, the weight of the ship, be known.

IV. We have now to seek the conditions which should determine the necessary extent of the sliding-ways. We imagine that these should be such, *first*, that the ship should not "tip" over their extremities when her centre of gravity has proceeded beyond them; and, *second*, that when the fore-ends of the bilge ways arrive at the after ends of the sliding-ways, the ship should be perfectly afloat, that is, her immersion forward shall be as much as her weight and trim demand.

We shall first, then, discuss how calculations can be made to determine the extent of the ways, to insure against any motion of depression about their extremities when the centre of gravity of the ship has passed them.

We have already seen that there is, for each position of the ship, a point at which, if we apply a single force of a determinable amount, no rotary motion will ensue, the distance of this point before the centre of gravity of the ship is (fig. 2.)

$$N H = \frac{w - H H'}{(W \times w) \cos. a}.$$

which we may see increases faster and faster with the descent into the fluid, and finally becomes infinite, in consequence of the increase of w, which gradually adds to the numerator, and diminishes the denominator of the fractional expression for N H, and ultimately equals W, reducing the denominator to zero. The point, N, therefore coinciding with H, when the immersion commences, moves forward with an increasing velocity as it progresses; at the same time the ship has a motion of her own in the opposite direction; so that while the rate of the motion of the point of N towards the forepart of the vessel remains less than that of the ship astern, the resultant motion of that point will be down the sliding-ways. This will evidently happen at the first stages of the motion, since N's velocity in relation to that of the ship commences from zero. But at that instant, when these two rates are equal to one another, the point N will become stationary, and will have reached its maximum distance from the fore-end of the sliding-ways. After this, the said point

having a greater motion forward in relation to the vessel than the vessel herself has in the opposite direction, its resultant motion will be up the sliding-ways. Now it is pretty evident that, if a portion of these ways be always found beneath the point N for every position of the ship, there will be no forces to produce a rotary motion in her, and therefore she will acquire no such motion; and this will be the case if the ways be extended to that point where N attains its maximum distance from their upper ends. And we might calculate without much difficulty (assuming the weight of the ship and the position of the centre of gravity) the positions of the point N for intervals of every six inches of immersion, or every eight feet of the ship's path, from which we could find the above maximum, and so determine the extent of the ways.

The second condition, namely, that the ship be perfectly afloat immediately she leaves the slide, will be fulfilled if the depth of water above the extremities of the slide, when those extremities have been determined as above, be sufficient to immerse the ship so that she shall have her proper light draught of water forward when the bilgeways leave the slide. But if this depth be too small, then the length of the slide must be increased till a depth great enough is obtained. Whichever condition would give the greater length must, of course, determine the question.

When N has reached the fore-end of the bilgeways, the ship will begin to "'scend," that is, to move upwards and about that point, though she will continue to descend deeper into the water, (beyond that depth at which her displacement is that with which she will afterwards float), till the vertical *vis viva* accumulated in her descent has been destroyed by the action of the excess of the upward pressure of the fluid above her weight, and an oscillatory motion, more or less perceptible, will of course ensue.

These, we believe, are the main features of the ship-launch, viewed through the medium of the laws of mechanics. We give them, not because we think they will be of any very *direct* practical assistance to professional men, but because we believe them valuable in aiding to form clearer and more correct practical notions of the operation than any one unacquainted with them can possibly attain. We think they are as complete as the difficulties of hydrodynamical science will permit us to make them.

In conducting the practical calculations sketched above, the same difficulties are met with as are experienced in performing similar operations for a ship—such as in finding her weight and the position of her centre of gravity. The only method of effecting these being the somewhat rude one of comparison with ships already afloat.

ON A NEW SMOKE-CONSUMING AND FUEL-SAVING FIREPLACE,

WITH ACCESSARIES ENSURING THE HEALTHFUL WARMING AND VENTILATION OF HOUSES.

Being a Paper read before the Royal Society of Arts, May 10, 1854,

BY NEIL ARNOTT, M.D., F.R.S.

The great evils connected with the common coal fires are:

I. Production of Smoke.

II. Waste of Fuel.

III. Defective Warming and Ventilation of Rooms.

We shall consider these in order:

I. OF SMOKE IN THE INTERIOR OF HOUSES, AND IN THE EXTERNAL ATMOSPHERE.

The proverb which declares a smoky chimney to be one of the greatest troubles of life, may suffice in relation to the interiors; in regard to the exterior, many particulars have to be noted. Examination of the question has ascertained that in London alone, on account of its smoke-loaded atmosphere, the cost of washing the clothes of the inhabitants is greater by two millions and a half sterling a year (that is, twenty-five times one hundred thousand pounds) than for the same number of families residing in the country; and this is seen to be but a small part of the expense when we consider the rapid destruction of all furniture in houses, as of carpets and curtains, of articles of female apparel, of books and paintings, of the internal decorations, and even of the external surface of the stones of which edifices are built. For personal cleanliness it is necessary to be almost constantly washing the hands and face. Flowering shrubs and many trees cannot live in the London atmosphere, so that the charm of a garden, even at considerable distances from town, has almost ceased with the extension of the buildings and increase of smoke. A growing flower, if exposed to the atmosphere, is always covered with blacks or sooty dust, and defiles the hand which plucks or touches it. Sheep from the country, placed for a few days to graze in any of the parks, have soon a dingy fleece, strikingly apparent when others newly arrived are mixed with them. And this atmosphere, so damaging to inanimate things and to vegetable life, is inimical also to the health of man, as proved by numerous facts recorded in the bills of mortality. Many persons, with certain kinds of chest weak-

ness, cannot live here. Many children brought from the country are seen soon not to be thriving. The coal-smoke, then, may be called the great nuisance and opprobrium of the English capital.

II. OF WASTE OF FUEL.

Count Rumford, a writer of great authority in such matters, after making many elaborate experiments, declared that five-sixths of the whole heat produced in an ordinary English fire goes up the chimney with the smoke, to waste. This estimate is borne out by the facts observed in countries where fuel is scarce and dear, as in parts of Continental Europe, where it is burned in close stoves, that prevent the waste. With these a fourth part of what would be consumed in an open fire suffices to maintain the desired temperature. I have myself made experiments here in London with like results. To save a third part of the coal burned in London alone, would save more than a million sterling a year; and when coal is very dear, as during last winter, the saving would be much greater.

Then it is to be considered that coal is a part of our national wealth, of which, whatever is once used, can never, like corn or any produce of industry, be renewed or replaced. The coal mines of Britain may truly be regarded as among the most precious possessions of the inhabitants, and without which they could never have attained to the importance in the world which the extraordinary development of their mental and bodily faculties has now given them. It is enough to say that, without coal, they would not have had or used the steam-engine. To consume coal wastefully or unnecessarily, then, is not merely improvidence, but is a serious crime committed against future generations.

III. OF DEFECTIVE HEATING AND VENTILATING IN DWELLINGS.

Calling a thousand a week the average rate of mortality in London alone, it was found in the middle of last winter, that nearly 700 additional deaths occurred owing to the intense cold which then prevailed, and against which, evidently, the existing arrangements for warming and ventilating were insufficient. Not a little of the premature mortality at all times, and of the spread of epidemics, and of the low condition of health among the people, is doubtless owing to the same cause.

We shall now inquire whether it be or be not possible in a great measure to avoid the three great evils above described, and at the same time to secure other advantages.

I. SMOKE.

Is it possible to avoid or to consume smoke—in other words, to produce a smokeless coal fire?

Common coal is known to consist of carbon and bitumen or pitch, of which pitch again the elements are still chiefly carbon and hydrogen, a substance which, when separate, exists as an air or gas.

When the coal is heated to about 600° Fahrenheit, the bitumen or pitch evaporates as a thick, visible smoke, which, when it afterwards cools, assumes the form of a black dust or flakes, called blacks, or smut, or soot. If that pitch, however, or pitchy vapour, be heated still more, as it is in the red-hot iron retorts of a gas work, or in rising through a certain thickness of ignited coal in an ordinary fire, it is in great part resolved into invisible carburetted hydrogen gas, such as we burn in street-lamps.

Now when fresh coal is thrown upon the top of a common fire, part of it is soon heated to 600°, and the bitumen of it evaporates as the visible smoke, which immediately rises. Of such matter the great cloud over London consists. If the pitchy vapour, however, be heated to ignition by the contact of a flame or of ignited coal near the surface, it suddenly becomes in great part gas, and itself burns as flame. This is the phenomenon seen in the flickering and burning which takes place on the top of a common fire.

But if fresh coal, instead of being placed on the top of a fire, where it unavoidably must emit visible pitchy vapour or smoke, be introduced beneath the burning, red-hot coal, so that its pitch, in rising as vapour, must pass among the parts of the burning mass, it will be partly resolved into the inflammable coal gas, and will itself burn and inflame whatever else it touches. Persons often amuse themselves by pushing a piece of fresh coal into the centre of the fire in this way, and then observing the blaze of the newly-formed gas.

Various attempts, beginning perhaps with Dr. Franklin's, have been made to feed fires always from below, and so to get rid altogether of smoke. Another more recent one was made about thirty years ago, by an ingenious manufacturer in London, Mr. Cutler. He placed a box filled with coal under the fire, with its open mouth occupying the place of the removed bottom bars of the grate, and in the box was a moveable bottom, supporting the coal, by raising which the coal was lifted gradually into the grate to be consumed. The apparatus for lifting, however, was complicated, and liable to get out of order, which, with other reasons, caused the stove to be little used. The moveable bottom rested on a cross-bar of iron, which in moving was guided by slits in the side of the coal-box, and was lifted

by chains at each end, drawn up by a windlass, and this windlass was turned by bevel wheels, of which one had to be moved by a winch in the hands of an attendant. Mr. Cutler was not aware that others had been engaged in the same pursuit, and took out a patent for his apparatus. A trial at law, however, afterwards decided that he had no patent right.

In the new fire-grate which I am now to describe, I have sought in every part the greatest possible simplicity which could give complete efficiency. The charge of coal for the day is placed in a box immediately beneath the grate, and is borne upwards, as wanted, by a piston in the box, raised simply by the poker used as a lever, and as readily as the wick of an Argand lamp is raised by its screw; the fire is thus under command, as to its intensity, almost as completely as the flame of a lamp. There are notches in the piston-rod for the point of the poker, and a ratchet catch to support the piston when the lever is withdrawn.

The coal-box of an ordinary fire may have a depth of seven or eight inches, which will receive from twenty to thirty pounds of coal, according to the area. In winter an inch or two more depth of coal may be placed over the mouth of the box before the fire is lighted, and in warmer weather the box will not require to be quite filled; that is to say, the piston at the time of charging needs not to be lowered quite to the bottom. If it become desirable on any account, as will happen with kitchen fires, to replenish the coal-box in the course of the day, it may be done almost as easily as to put coal on a common fire; thus, when the piston has been fully raised, so as to have its flat surface flush with the bottom bar of the grate, a broad flat shovel or spade, of the shape of the bottom of the grate, is pushed in upon the piston, and it becomes at once a temporary bottom to the grate and a lid to the coal-box. The piston being then allowed to sink down to the bottom of the coal-box, the spade or lid is raised in front by its handle, and opens the box, so that a new charge of coal can be shot in. The spade being then withdrawn, the combustion goes on again just as in the morning. That the opening of this lid may be wider, the second bar of the grate is hinged, and yields to the upward pressure of the spade.

This fire is lighted with singular ease and speed. The wood is laid on the upper surface of the fresh coal filling the coal-box, and a thickness of three or four inches of cinder or coked coal, left from the fire of the preceding day, is placed over it. The wood being then lighted, instantly ignites the cinder above, and at the same time the pitchy vapour from the fresh coal below rises through the wood flame and cinders, and becomes heated sufficiently to inflame itself, and so to augment the blaze. When the cinder is once fairly ignited, all the bitumen rising through it afterwards becomes gas, and the fire remains quite smokeless ever afterwards. A fireplace supplied with coal from below was used by a distinguished engineer in town for ten years, and the fact that his chimney had not to be swept in the whole of that time, proved that no soot was formed.

In the new grate, because no air is allowed to enter at the bottom of the coal-box—for the piston-rod fits its opening pretty accurately—there is no combustion below, but only between the bars of the grate, where the fuel is completely exposed to the air, and near the mouth or top of the coal-box. The unsatisfactory result of some other attempts to make such a fire have been owing, in part, to the combustion extending downwards in the coal-box, because of air having been admitted below, and then consequent melting and coking of the mass of coal, so as to make it swell and stick, impeded the rising of the piston.

A remarkable and most valuable quality of this fire is, its tenacity of life, or its little tendency to go out or be extinguished. Even after nearly all the coal in the grate, surrounded by the fire-bars, has been consumed, the air will dive into the coal-box and keep the fire there gently alight, like a torch burning from the top downwards, until nearly the whole contents of the box are consumed; and thus the fire will remain burning for a whole day or night, without stirring or attendance, and yet at any moment it is ready to burn up actively when the piston is raised.

In certain cases, as during long nights, it may be desirable to ensure the maintenance of combustion with rather more activity, and for this purpose there is a slide in a small door at the front bottom of the coal-box, by which a graduated admission of air may be allowed. That door itself is open before lighting the fire, to allow of the removal of any coal-dust or ash which has fallen down past the edge of the piston.

Before lighting the fire in the morning, the little ash which remains with this form of combustion is removed from off the piston.

The fire is extinguished at night by allowing it to exhaust itself, or by lifting out the few lumps of coke or caked coal which remain. The morning charge should be such that enough cinder or coke may be left for the smokeless lighting of the next day.

By the means now described, then, the first-named evil of the *production of smoke* is effectually combated.

II. WASTE OF FUEL.

We now come to consider whether the *waste of fuel* which occurs in common open fires can be prevented.

Count Rumford, as the result of his own experiments already referred to, declared that 5-6ths of all the heat produced in a common open fire passed up the chimney with the smoke, and therefore to waste; and he appealed in corroboration to the experience of the Continent of Europe, where close stoves are used, which do not thus waste heat up the chimney, and where a much smaller allowance of fuel than is here needed in open fires suffices. I have, in my own house, a striking illustration of the matter in a peculiar enclosed fire, which, for fourteen years past, in a large dining-room, has maintained, day and night, from October to May, a temperature of 60° or more, accompanied with good ventilation, by an expenditure of only 12lbs. of coal for 24 hours, or about a fourth of what would be used in an open fire burning for 15 or 16 hours. The fire is lighted about the beginning of October, and is not extinguished at all until the following May. The aperture by which the fresh air enters the stove to maintain the combustion sufficient to warm that room, is about three-quarters of an inch in diameter. If this be compared with the aperture of a common chimney-pot, which has a diameter of ten inches, and an area or size 160 times greater than my stove, and one thinks of the rapidity with which a column of dense smoke filling that pot escapes from it when the fire is burning briskly; and reflects further that such column consists entirely of the warmest air from the room, blackened by a little pitchy vapour from the fire, there is proof of prodigious waste, and room for reasonable hope that a saving is possible. To see how a saving may be effected, the exact nature of the waste in such cases has now to be explained;—a single mouthful of tobacco smoke, on issuing, immediately diffuses itself so as to form a cloud larger than the smoker's head, and soon would contaminate the whole air of a room, as would also the smoke and smell of wood, paper, or other combustible burned in a room. Now, the true smoke of a common fire is not the whole of what is seen issuing from the chimney top, but only little driblets or jets which shoot up or issue from the cracks in the upper surface of coal which forms the fire. These jets, however, quickly diffuse themselves, like the tobacco smoke, in the air around them—that is to say, in the large volume which fills the space left over a common fire, and over the hobs, if there be such, at the side of the grate. The whole of the air so contaminated, and which may be in volume 30, 50, or 100 times greater than that of the true smoke, is then all called smoke, and must all be allowed to ascend away from the room. It is evident, then, that if a cover or hood be placed over a fire, so as to prevent the diffusion of the true smoke or the entrance of pure air from around to mix with it, except just what is necessary to burn the inflammable gases which rise with the true smoke, there would be a great economy. This has been done in the new fireplace with a saving of from one-third to one-half of the fuel required to maintain a desired temperature. In a room the three dimensions of which are 15 feet, 13½ feet, and 12 feet, with two large windows, the coal burned to maintain a temperature of 55° in the coldest winter days, has been 18 lbs. for 19 hours, or less than a pound per hour.

And it is to be remarked that not nearly the whole possible saving has been effected in the case referred to; for the grate was an old one imperfectly altered, and as the true smoke, little diluted, is very hot air when it leaves the ignited coal, and if it were made to pass in contact with a vessel containing water or colder air, it would give up for use a considerable part of its heat. In many cases such saving will be profitably effected. Under the present imperfect forms of open fire, the whole of the hot smoke passes away as certainly as here, but at present is so much diluted with the colder air of the room, that ordinary observers do not perceive, and, consequently, do not regret, the fact.

In many cases the contraction of the space over the fire will be more conveniently made in brickwork than by a metallic hood. Where the hood is used, unless it be made a boiler or water-vessel, it should be lined with tile to prevent that overheating which would cause in the room some smell of heated metal.

The stalk of the hood at the upper part passes closely through a plate or other stopping at the bottom of the chimney, so that no air shall enter the chimney but through the hood; and there is a throttle-valve or damper in the hood-stalk, giving perfect control over the current of air that passes through. No part of the apparatus is more important than this valve or damper, and its handle or index must be very conspicuous, and have degrees of opening marked on its plate as clearly as the points are marked on a compass-card. When the valve is quite open, the chimney acts to quicken the combustion, like that of a blast-furnace, or like a forge-bellows; but, by partially closing the valve, the current may be diminished, until only the most tranquil action remains. The valve should not be open in general more than just enough to let all the

burned air or thin smoke, which is scarcely visible, pass through. When the valve is once adjusted to the usual strength of chimney action, it requires little change afterwards.

In many cases it is desirable to be able to command and modify, by a moveable plate, the size of the front opening of the hood or fireplace, as well as the opening of the chimney throat. By the proper adjustment of the two, the desirable brightness of the front of the fire may be maintained.

The chimney-flue above the upper opening of the hood should have its sides made slanting, so as not to harbour dust or any soot which, from any careless use of the fire, might be produced. The size of the chimney-flue is not important.

The answer then to the second question, as to the possibility of saving fuel, is, by the facts here adduced, given in the affirmative.

III. DEFECTS OF HEATING AND VENTILATION.

The third and last of the great evils of the present open fires is that there are great irregularities and deficiencies in their heating and ventilating actions, which bear so powerfully on the public health. The hood and its damper, as influencing these, may appear perhaps of more importance than as saving the fuel.

The hood and its damper, by allowing so small a quantity of air to pass through in comparison with what rises in an open ordinary chimney, lessens in the same degree the cold draught of air towards the fire from doors and windows, and which are common causes to the inmates of winter inflammation and other diseases; and for the same reason the heat, once radiated from the fire towards the walls of the room, not being again quickly absorbed and carried away by such currents of cold air as are referred to, remains in the room, and soon renders the temperature of the whole more equable and safe.

Still more completely to prevent cold draughts approaching from behind persons sitting around the fire, the fresh air for the room is conveniently admitted, chiefly by a channel which leads directly from the external air under the floor to the hearth, and there allows the air to spread from under the fender. The fender, exposed to the fire near it, becomes hot; the cold, fresh air then rising under it takes from it the excess of its heat, and so becomes itself tempered before it spreads in the room. The two evils of excess of heat and excess of cold, meet to neutralise each other, and to produce a good result.

The importance of general ventilation, again, is strikingly exhibited by such occurrences as the following, which was related at the meeting of scientific friends at which I first described the new fireplace, by Mr. Robert Chambers, of Edinburgh, as having happened not long ago in Glasgow. A large old building, which had been formerly a cotton mill, was fitted up as a barrack or dwelling-house for persons of the working classes, and had nearly 500 inmates. Like all foul and crowded human dwellings, fevers and kindred diseases soon became prevalent there. After a time, a medical man, who was interested, obtained permission from the proprietors of the neighbouring chemical works, in which there was a lofty and very powerful chimney, to make an opening of one foot in diameter into the side of the chimney for the ventilation of the lodging-house. He then connected with this a main tube from the lodging-house, which had branches running along all the passages or galleries, and from the ceiling of every separate room a small tube communicated with these branches. Soon after, to the surprise as well as to the delight of all concerned, severe diseases entirely disappeared from the house, and never returned.

Now the chimney from the new fireplace, although not very tall, has a ventilating power scarcely inferior to that of the Glasgow chemical works. The arrangement of the hood with its valve, as above described, by allowing only unmixed and very hot smoke to enter the chimney, instead of, as in common chimnies, smoke diluted with many times its volume of colder air, increases the draught just as it does the heat of the chimney, and through an opening then made into the chimney from near the top of a room, all the hot, foul air in the room, consisting, perhaps, of the breath of inmates, smell of meals, burnt air from candles, lamps, &c., and which else accumulates and stagnates at first near the top of the room, is immediately forced into the chimney and away. This is strikingly proved by placing near the ventilating opening a light body, as feathers or shreds of paper suspended to a thread, and seeing with what force it is drawn into the opening, that has a commom balanced chimney-valve in it, which, by the wire descending to a screw within reach of the hand, can be left open to any desired degree.

That valve I recommended many years ago, and its use has become pretty general over the country; but, in many cases, what I described as an essential concomitant—the contraction of the chimney-throat and the space over the fire—has been omitted, and the proper action of the valve has been prevented.

This is what I had to say on the correction of the third of the great evils of the

common fire, and I hope it has been shown to be possible to construct an open fireplace, scarcely differing in appearance from an ordinary English fireplace, with its pleasing associations, but which shall be smokeless, saving much fuel, and ensuring the healthful warmth and ventilation of our houses.

(*To be continued.*)

SLIDING CAISSON AT KEYHAM DOCKYARD.

At a recent meeting of the Institution of Civil Engineers, "A Description of the Sliding Caisson, at Her Majesty's Dockyard, Keyham, Devon," was read by Mr. W. Fairbairn, M. Inst. C.E.

The substitution of caissons for the ordinary lock-gates, and their employment for closing the wide entrances of docks, was first suggested in this country by General Sir Samuel Bentham; since his time they appear to have been somewhat extensively used, although the objections of occupying a considerable time in having the water pumped out of them, and it being necessary to float them entirely away from the opening before a vessel could pass, rendered them applicable only for special localities. The great width of opening required for the passage of ships of war, induced a rather general use of such caissons in the Royal Dockyards; and at the new dockyard at Keyham, where it was considered desirable to have the best accommodation for the newest class of large ships, the great breadth of the mouth and the depth of the basin induced the trial of a new form and arrangement of caisson, which should be of such capacity and dimensions as to resist the pressure of the water, effectually close the entrance, and still be so easy of manipulation as to admit vessels of war passing into the dock at any state of the tide.

The Keyham Docks were described as extending along the eastern shore of the Hamoaze, immediately below Morris Town; their construction was commenced in 1844, and they consisted principally of two capacious basins, with several entrances or locks from the sea; one of these it was thought desirable to construct in such a manner as to have the power of using it, when necessary, for a dry dock; its dimensions were 260 feet long, 80 feet wide, and 43 feet deep; the inner end, next the dock, was closed by a caisson of the ordinary form, and at the outer end, next the channel, the new caisson was tried. It was designed by Mr. W. Scamp, of the Admiralty, and was constructed by Mr. W. Fairbairn, by whom a description was transmitted to the Institution.

The form of the caisson was that of a rectangular vessel, 82 feet 6 inches long at the top, 68 feet 6 inches long at the bottom, 42 feet high, and 13 feet 6 inches wide; it was built of wrought-iron plates, varying in thickness from ⅘ths inch, at the bottom, to ⅜ths inch at the top, well supported throughout by an inside frame-work of angle iron and gusset-pieces, and by two decks of iron and one of timber for the interior arrangements, but which at the same time imparted great strength to the structure.

The plates were connected by "butt-joints," with covering plates, attached by double and quadruple rows of rivets, and the bottom and ends were clothed with oak timber which bedded upon the cill, and against the jambs, when the caisson was in its place. The internal arrangements of the caisson were such, that when it was required to withdraw it from across the opening of the lock, by merely opening a valve, a sufficient quantity of water escaped from the upper chambers, to allow the body to rise a few inches from the bottom cill, when instead of, as in the ordinary system, turning it round and floating it away, it was drawn back, by chains, transversely into a channel or opening in the masonry, at right angles with the lock, leaving an opening of the clear span, and after the passage of the ship, it was drawn cross again, and by opening another valve, as much water entered as settled it securely on its bed or cill. This operation was stated to have occupied only eighteen minutes for the passage of a line-of-battle ship; ten minutes for opening and eight minutes for closing. The total weight of the caisson was shown to be 290 tons; it contained 33 tons of iron ballast, and had an internal capacity for 323 tons of water. The mechanical arrangements were minutely described, and the general result appeared to have been very successful; and from the tabular statement of the deflection of the caisson, under the pressure of various depths of water, the structure appeared amply strong for resisting either the dead pressure, or the concussions of the waves which frequently beat heavily against the entrance of the docks.

BILLING'S NEW SYSTEM OF VENTILATION.

At the present time, when the subject of ventilation is very properly absorbing a large amount of public interest, a short description of Mr. Billing's simple but valuable improvements on the means of ventilating buildings and other structures will be likely to prove useful. The method provides for the escape of vitiated, and the

entrance of pure air, an equable atmospheric pressure, and at the same time is contrived so as to preclude the entrance of rain, sleet, &c. A simple mechanical appliance for partially or wholly excluding the air is, when necessary, to be connected with it.

The accompanying engravings represent detached portions of a roof constructed according to Mr. Billing's improvements

Fig. 1. Fig. 2. Fig. 3.

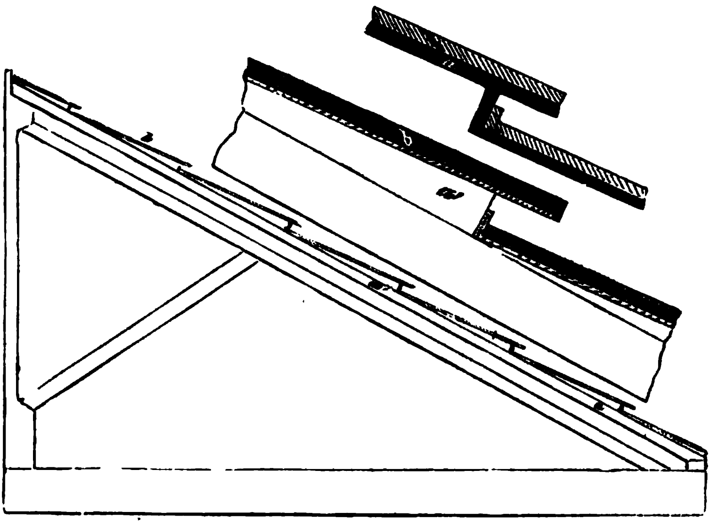


Fig. 1 is a section of part of the roof; figs. 2 and 3 are other sections on a larger scale. From these figures it will be seen that the rafters, *a*, *a*, have inclined bearers, *a'*, *a'*, formed upon them for receiving the tiles or plates, *b*, *b*; and the upper edge of each tile or plate, *b*, is turned up, or a strip of wood or other material is fixed to the inclined bearers, as shown, and the lower edges of the several tiles or plates overlap the upper edges of the next below them, so that rain, sleet, &c., may be prevented from beating in.

By applying the same principle of construction to windows, &c., it is evident a free current of air, sufficient to keep an apartment in a healthy condition, may be secured at a small expense, the annoyance arising from the direct action of drafts being at the same time altogether obviated. It is plain that these features give the method considerable advantage over several at present in use. Among roofed structures, to which the invention appears to be peculiarly well adapted, we may mention railway stations, arcades, conservatories, baths and washhouses, manufactories, distilleries, breweries, and other buildings where a speedy substitution of pure for vitiated air is desirable.

METHOD OF PREVENTING INCRUSTATIONS IN STEAM GENERATORS.

(Translated from the *Moniteur Industriel*, for the *Mechanics' Magazine*.)

Mr. Fresenius remarked that since 1821 no incrustation had formed in the boiler of a steam engine at Ems, when fed with water containing the following solid matters in every 100 grammes:

Carbonate of soda	11·35
Sulphate of soda	0·11
Chloride of sodium	7·27
Sulphate of potash	0·44
Carbonate of lime	1·24
Carbonate of barytes	1·07
Carbonate of barytes and strontian	0·002
Carbonate of iron	0·017
Carbonate of manganese	0·008
Phosphate of alumina	0·011
Silex	0·38

From this fact Mr. Fresenius concluded that it was not carbonate of lime, but sulphate of lime which produced incrustations, and the formation of this salt in the present instance was prevented by the large amount

of soda contained in the water. He thence proceeded to make several experiments, which consisted in adding soda to the waters containing sulphate of lime, and which had hitherto given rise to strong incrustations. This experiment was always crowned with complete success. Mr. Frenesius was thus induced to recommend the employment of soda as the best means of preventing incrustations. The learned chemist gave, moreover, the following rule for preventing the addition of soda in excess—100 parts of anhydrous sulphate of lime are decomposed by 78 parts of pure calcined lime. Proceeding from this principle the exact quantity of soda to be added to the water may easily be ascertained in each particular case, taking care, however, always to have a slight excess of this preserving substance, and, consequently, the water of the boiler should be tested from time to time. The following is a very simple method of effecting this trial:—a measured quantity of the water is taken from the boiler, filtered, if necessary, and divided into two equal parts; a portion of soda is added to one part, and a portion of lime-water to the other. If the former remains clear while the latter becomes slightly agitated, the proportion of soda is correct; if the contrary takes place, then soda must be added; but if the water tested with the lime-water is agitated, then soda should be removed.

CAST-IRON FOR ARTIFICIAL MAGNETS.

M. Crahay found, several years ago, that cast-iron may acquire, by tempering, a coercive force sufficiently great to allow it to be strongly and permanently magnetized. The gray iron is the best for this purpose. The pot-metal is too brittle, and the first quality of cast-iron gives but moderate results.

The permanence of the magnetism depends on the temper. A bar tempered at a dull red heat may be powerfully magnetized, but loses its force in twenty-four hours. If the tempering is done at a bright red heat, the bars not only will take a powerful magnetism, but keep it indefinitely. Experiment has shown that the following is the best mode of tempering large bars: They are to be heated to redness in a wind furnace, then withdrawn, one by one; the two faces of the bar are sprinkled for three-fourths of their length with yellow prussiate of potassa, and immediately plunged into a great mass of cold water, stirring it about violently. A little more thickness should be given to bars of cast-iron than to steel.—*Journal of the Franklin Institute.*

PROPULSION BY JETS OF WATER.

To the Editor of the Mechanics' Magazine.

Sir,—Mr. Baddeley may quibble about words, and construct definitions from my late remarks, as much as he pleases. But the fact remains, that the power required to force water through long and narrow passages at high velocities, is greater than the power required to force it through very wide and very short passages at more moderate velocities. *Theoretically*—to use the word in its popular sense, though a much abused word—the efficiency in both of the two cases above put, would be 100 per cent. of the power applied; practically, there would be a great difference, because the resistance by friction and other causes of loss, is very different, and is greatly affected by the circumstances referred to.

Mr. Baddeley seems fond of quoting authorities. I never do, where I can hold an opinion of my own.

I am, Sir, yours, &c.,

London, May 16, 1854. D. K. C.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Brooman, Richard Archibald, of 166, Fleet-street, London, patent-agent. *Improvements in the manufacture of coloured and ornamental fabrics.* (A communication.) Patent dated October 27, 1853. (No. 2494.)

This invention consists—1. In the preparation of threads, before or while they are being woven, with a mastic or other substance capable of being rendered viscous by heat or essential oils, or otherwise, and in the application to such threads, after they have been formed into a fabric, of pigments or ornamenting matters. The mastics or mordants employed, by preference, are bituminous and resinous substances, and preparations of caoutchouc and gutta percha.

The invention consists—2. In the preparation of threads, before or while they are being woven, by passing them through, or applying to them colours, which are fixed after the threads have been formed into a fabric. The colours employed in this manner are those called steam colours—that is, colours which contain, or which have combined with them, salts or mordants necessary for their becoming fixed by the application of steam, and which are only fixed after being woven into a cloth or fabric.

Maclaren, Malcolm, of Johnstone, Renfrew, North Britain, surgeon. *Improvements in fireplaces, grates or furnaces.* Patent dated October 28, 1853. (No. 2495.)

Claim.—1. A mode of arranging and constructing domestic fireplaces, wherein the

heated currents are directed behind the front plate of the grate for the purpose of obtaining an enlarged heating area. 2. A mode of arranging fireplaces wherein the heated currents may either pass directly upwards from the fuel to the chimney, or be directed behind the main body of the grate more or less at pleasure. 3. The application and use in fireplaces of an adjustable cover or plate over the fuel to divert the heated currents behind the grate. 4. The application and use of chimney or mantelpieces of metal or other material for the purpose of obtaining an extended heating surface by passing the heated currents behind the chimney or mantel-pieces.

SERVAN, ARISTIDE MICHEL, of Philpot-lane, London. *Improvements in treating phormiumtenax, flax, and other vegetable fibrous matters.* Patent dated October 28, 1853. (No. 2496.)

This invention consists of improvements in treating the plants from which vegetable fibres are obtained, by subjecting them to the action of a solution of alum, or to caustic lime and carbonic acid, or to both.

JOHNSON, JOHN, of Over Darwen, Lancaster, mechanic. *Improvements in looms for weaving terry and other similar fabrics.* Patent dated October 28, 1853. (No. 2497.)

This invention consists—1. In certain improved stays for the wires on which the terries or loops are woven, the said stays being for the purpose of preventing or diminishing the vibration of the wires as they are advanced towards and inserted into the open shed; and, 2, in an improved combination of parts for giving motion to the carriages and the carriers to which the terry wires are attached.

WILKINS, JOHN WALKER, of Ludgate-hill, London, electric telegraph engineer. *Improvements in obtaining power by electro-magnetism.* Patent dated October 28, 1853. (No. 2498.)

Claim.—Obtaining power from electro-magnets constructed in such manner that the current of electricity passing through the wire round any one pole of any magnet assists in magnetising other magnets by which it may be surrounded.

NASMYTH, JAMES, of Patricroft, Lancaster, engineer. *Improvements in the pistons and piston-rods of steam-hammers and pile-drivers, and in the parts in immediate connection therewith.* Patent dated October 29, 1853. (No. 2500.)

This invention consists—1. In constructing the piston-rod glands of steam-hammers and pile-drivers in two or more pieces for the purpose of allowing the knob at the lower end of the piston-rod, or the projection to which the piston is secured, to pass through the hole in the cylinder bottom. 2. In improved means of connecting pistons to the piston-rods of steam-hammers and pile-drivers. 3. In making the piston, piston-rod and the knob at the lower end of it in one piece. 4. In an improved packing ring of a triangular section for the pistons of steam-hammers and pile-drivers.

BROOMAN, RICHARD ARCHIBALD, of 166, Fleet-street, London, patent agent. *Improvements in machinery for dressing flax, hemp, and other like fibrous substances.* (A communication.) Patent dated October 29, 1853. (No. 2503.)

A full description of this invention formed the first article of our last Number.

MACLURE, ANDREW, of Walbrook, London. *Improvements in lithographic printing-presses.* Patent dated October 29, 1853. (No. 2505.)

In this invention the damping apparatus (which consists of a roller or sponge and water trough) is combined with inking rollers and an ink trough, and have a traversing motion giving to them, so as to pass over the printing surface, which remains still, and thus damp and ink it.

BETTS, WILLIAM, of Wharf-road, City-road, Middlesex, gentleman. *Certain improvements in machinery for manufacturing metallic capsules.* Patent dated October 29, 1853. (No. 2506.)

These improvements mainly relate to a method of setting the die on springs, so as to allow it to assume the necessary position for receiving the punch when in the act of producing capsules; and to the use of a sliding bolt, which being acted upon by a weight, pushes the capsule out of the die.

WRIGHT, JOHN TURNER, of Birmingham, Warwick, manufacturer, EDWARD PAYTON WRIGHT, of the same place, manufacturer, and WILLIAM ASBURY, also of the same place, engineer. *An improvement or improvements in mill-banding.* Patent dated October 31, 1853. (No. 2507.)

Claim.—The introduction of wires, lines, threads, or cords of metal or other material having flexibility, and not being liable to permanent elongation by tension into mill-bandings made of gutta percha.

HALEY, JOSEPH, of Manchester, Lancaster, engineer. *Improvements in machinery or apparatus for cutting, boring, and shaping metals and other substances.* Patent dated October 31, 1853. (No. 2508.)

This invention relates—1. To an improved machine for boring, facing or shaping any object when a number of such operations are required, parallel to each other, and at a right angle to the axis of the objects, such as the cross-head beam or crank of a steam engine. 2. To a machine for boring and slotting, which is intended to bore any well, pulley, or other similar object, and to slot

or cut the key-way in the same before being released from the face-plate or check, thereby saving the time and labour usually employed in refixing in a separate machine. 3. To an improved drilling machine; and, 4. To an improved method of traversing the driving strap from one pulley to another.

BANNER, EDWARD GREGSON, of Cranham-hall, Essex, gentleman. *Improvements in obtaining and applying motive power.* Patent dated October 31, 1853. (No. 2509.)

Claims.—1. The application of a spring or springs acting at a given angle for the purpose of disturbing the equilibrium of a system capable of rotation round an axis. 2. The introduction of curvilineal buckets, when rotation is caused by means of water or other fluids, such that the line of pressure is at right angles to the horizontal tangent of the curve. 3. The prevention of waste in water-wheels by the introduction of a wall buttress or casing, for the purpose of keeping the buckets full for nearly the entire height of the vertical diameter.

ROVERE, FELIX PAULIN, of Wellington-street, Strand, Middlesex, civil engineer. *Improvements in joints for tubular drains.* Patent dated October 31, 1853. (No. 2511.)

This invention consists in forming the splay or bevel joint at any angle whatever but a right angle with the longitudinal side or axis of the tube-pipe, drain, or sewer, instead of at right angles as at present practised.

PARSONS, PERCEVAL MOSES, of Duke-street, Adelphi, Middlesex, civil engineer. *Certain improvements in the switches and crossings of railways.* Patent dated October 31, 1853. (No. 2512.)

The main part of this invention consists in removing a portion of the upper part of the wing and point rails of crossings, and the tongue rails of switches at the part most subjected to wear, and in replacing such portions by other pieces of a suitable form, and securing them firmly in their places by means of bolts, screws, keys, or wedges, or by dovetailing, wedging, riveting, or casting such pieces on to the rails.

GRAY, JOHN, of Dublin, medical doctor and newspaper proprietor. *A self-acting flushing apparatus, applicable to sanitary purposes.* Patent dated Oct. 31, 1853. (No. 2513.)

Claim.—The combination of a cistern with a suitable self-acting apparatus, the cistern being filled at a regulated rate, and suddenly emptied at regular intervals by means of a bucket chamber or other similar vessel.

HAMILTON, GEORGE, of Paisley, Renfrew, North Britain, bleacher. *Improvements in spreading or distributing starch, gum, and other semi-fluid matters.* Patent dated October 31, 1853. (No. 2514.)

In carrying out this invention, the semi-fluid materials are deposited in a receiver or feed-box, having within it a set of feeding or supplying-rollers.

COUBROUGH, ANTHONY PARK, of Blanefield, Stirling, North Britain, calico-printer. *Improvements in printing textile fabrics and other surfaces.* Patent dated October 31, 1853. (No. 2515.)

The main claim of the inventor is a mode of arranging block printing apparatus, wherein the fabric to be printed is guided and conveyed by rollers alternately over a range of impression tables, and through a drying chamber, being finally made to traverse the latter circuitously, so as to be delivered in a dry and finished state.

BROWN, JOHN, of Darlington, Durham, mining engineer. *Improvements in the construction of wagons.* Patent dated October 31, 1853. (No. 2516.)

Claims.—1. The construction of wagons with their bottoms projecting below the axles, and with discharging apertures at their lower parts. 2. The application and use of sliding or hinged doors at the bottom of the wagons.

ASSANTI, DAMIANO, of Upper Berkeley-street, Middlesex, gentleman. *A new or improved cooling or freezing mixture.* Patent dated October 31, 1853. (No. 2517.)

Claim.—The production of a cooling mixture by the addition of chloride of lime to water or other liquid, and of a cooling and freezing mixture, by the addition of chloride of calcuim to water or other liquid.

RESTELL, RICHARD, of Croydon, Surrey, watch and clockmaker. *Improvements in warming conservatories, greenhouses, and other buildings.* Patent dated October 31, 1853. (No. 2518.)

Claim.—The warming of conservatories, greenhouses, and other buildings by means of a jet or jets of gas inserted in an ordinary pipe, in communication with other pipes circulating through the building to be heated.

CROWLEY, JOHN, of Sheffield, York, iron-founder. *Improvements in the construction of ovens and furnaces.* Patent dated November 1, 1853. (No. 2521.)

This invention consists—1. In improvements in the construction of ovens or furnaces for annealing metal castings. 2. In an improved mode of constructing the pots or cases in which metal castings are contained while they are being annealed. 3. In supporting the castings in the annealing pots or cases by arches. 4. In improvements in the construction of furnaces for converting iron into steel. 5. In self-acting machinery for regulating the opening of the dampers according to the volume of smoke evolved in steel-converting and other furnaces.

LOMAS, SAMUEL, of Manchester, manager. *Improvements in machinery for spinning and doubling silk.* Patent dated November 1, 1853. (No. 2522.)

This invention consists in the use of a friction roller mounted loosely on a stud, around which roller the silk is passed in going from the upright bobbin to the shaft bobbin of machines for spinning or doubling silk.

NEWTON, MARK, of Tottenham, Middlesex, builder. *Certain improvements in the construceion of carriages, and in the means of preventing the overturning of the same when horses take fright.* (A communication.) Patent dated November 1, 1853. (No. 2524.)

The first part of this invention relates to improvements in the construction of carriages with two wheels, and consists in making the bodies of them with a flat bottom, in order to avoid a well. The bottom of the body is slightly raised in front, so as to afford greater convenience to persons getting in and out. The second part of the invention consists in a peculiar mode of connecting the splinter-bar to the carriage.

ELLIOTT, ARTHUR, of West Houghton, Lancanter, mechanic. *Improvements in looms for weaving.* Patent dated November 1, 1853. (No. 2525.)

The first part of this invention relates to rising-box looms, and consists, firstly, in a method of raising and lowering the shuttles as required; secondly, in placing screens above the pickers, so adapted as to be raised by hand at pleasure; and, thirdly, in causing the picker to occupy such a position when the shuttle is thrown as to receive its force, and by giving way before it act as a check upon its impetus. The second part of the invention consists of an arrangement for taking up the work on the principle of Stone's apparatus.

WHITEHEAD, JOHN, and THOMAS WHITEHEAD, of Leeds, York, machine tool-makers. *Certain improvements in cutting-tools, and in the working of iron, brass, and other metals, and wood and other materials.* Patent dated November 1, 1853. (No. 2526.)

Claims.—1. The employment of three or more cutters mounted in one and the same saddle or head, and capable of acting simultaneously on the work whether employed in cutting concave or convex surfaces. 2. The use of worms having saw-teeth on their periphery for the purpose of cutting the teeth of wheels and racks. 3. An arrangement of cutting tools for planing, fluting, shaping, or slotting metals, wood, and other materials.

TYLOR, HENRY, of the firm of Tylor and Pace, of Queen-street, London, manufacturers. *An improved chair-bedstead.* Patent dated November 1, 1853. (No. 2527.)

Claim.—The constructing of chair-bedsteads in such manner, that when used as a chair, the back, or that part forming the back, is supported by those parts which form the arms, while, when used as a bedstead, those parts which formed the arms of the chair become the legs or supports for one end of it.

CHESTERMAN, JAMES, of Sheffield, York, machinist. *Improvements in hardening and tempering steel, and in grinding, glazing, buffing, and brushing steel and other metallic articles.* Patent dated November 1, 1853. (No. 2528.)

A full description of this invention forms the first article of this Number.

BANER, JOSEPH, Captain, Austrian army, of Prague, Bohemia. *Cultivating and digging the soil by means of a steam-digging and harrowing-machine.* Patent dated November 1, 1853. (No. 2530.)

This invention consists of an elaborate arrangement of parts, the object of which is to produce actions corresponding to those of men in digging, the machine receding at each stroke or cut.

GATTY, FREDERICK ALBERT, of Accrington, Lancaster, manufacturing chemist. *An improved bath for heating and distilling.* Patent dated November 2, 1853. (No. 2535.)

Claim.—The use of gas-tar, in either its natural or a prepared state, as a bath for heating and distilling.

SMITH, EDWIN DALTON, of Hertford-street, May-fair, Middlesex. *A new buffer-break for railway carriages.* Patent dated November 2, 1853. (No. 2536.)

This invention consists in a buffer-break, the object of which is to put the breaks upon all the wheels of the carriages at nearly the same moment.

WARD, EDWARD, of Potton, Bedfordshire, coach-builder. *An improvement in carriage-axles.* (A communication.) Patent dated November 2, 1853. (No. 2538.)

Claim.—The fixing of a sleeve or case, formed of any suitable metal or alloy, upon that part of a carriage-axle on which the axle-box works.

LIPSCOMBE, FREDERICK, of the Strand, Middlesex, water-filter manufacturer. *Improvements in obtaining steam power, and in regulating the same.* Patent dated November 2, 1853. (No. 2541.)

Claim. — A mode of superheating the whole or any portion of the steam pipes or passages which convey the steam from the boiler or generator to the cylinder of an engine or other point where the effective force of the steam is to be used, such pipe or passages having one or more self-acting valves, either inside or at their entrance, for the purpose of preventing the heat from the

superheated pipe or passages from gaining access into the boiler or generator.

Brierly, Henry, of Chorley, Lancaster, manufacturer. *Improvements in machinery or apparatus for spinning and doubling cotton and other fibrous substances.* Patent dated November 2, 1853. (No. 2543.)

The inventor describes and claims a mechanical combination constructed for the purpose of stopping the spindles gradually, and thus preventing the injurious shock and reaction which are caused when they are stopped too suddenly; and a second mechanical combination for effecting the operation of backing off.

Howard, James, of Bedford, ironfounder. *Improvements in horse-rakes and harrows.* Patent dated November 2, 1853. (No. 2544.)

Claims.—1. The substitution of steel tines or teeth for those of wrought iron at present used in the manufacture of horse-rakes. 2. A peculiar mode of attaching the tines or teeth to harrow-frames.

Hodges, Richard Edward, of Southampton-row, Russell-square, Middlesex. *An improvement in fastening the ends of springs made of India-rubber.* Patent dated November 2, 1853. (No. 2545.)

This invention consists in employing a tube or ring of very small diameter compared with that of the India-rubber spring, the end of which requires to be held.

Iles, Charles, of Peel-works, Birmingham, Warwick. *Improvements in metal bedsteads.* Patent dated November 2, 1853. (No. 2546.)

This invention is applicable to metal bedsteads where the posts are hollow or tubular; and the improvements consist in fixing one or more discs or partitions of metal in the hollow or tubular post, each such disc having a hole through it to receive a rod, which is passed into the post to fix the side and end rails.

McGregor, Peter, of Manchester, machine maker. *Improvements in machinery for spinning and doubling.* Patent dated November 3, 1853. (No. 2547.)

This invention consists — 1. In a new combination of machinery for working the radial arm of self-acting mules or other similar machines for spinning and doubling. 2. In the application of a cam-shaft and parts for backing off, which are common to Roberts' self-acting mules, to those in which the carriage is worked by a mangle-wheel. 3. In an improved mode of disconnecting the gearing, by which the carriage is taken out from that by which it is brought in, applicable to those self-acting mules in which the carriage is worked by a mangle-wheel, whereby the relative speeds in going out and coming in can be altered independently of each other. 4. In an improved combination of machinery for communicating the slow motion, technically called the "after draught," to the carriage, when near the end of its stretch.

Moffat, John, of Birmingham, Warwick, manufacturer. *An improvement or improvements in candlesticks.* (Partly a communication.) Patent dated November 3, 1853. (No. 2549.)

Claim.—Making the upper part of a candlestick moveable, so that the same may be raised or depressed, and its height accommodated to the level of a candle nearly burned out, instead of raising the candle as is ordinarily practised.

Irving, Thomas, of Dalton, Kirkheaton, York. *Improvements in preparing wool for spinning.* Patent dated November 3, 1853. (No. 2551.)

Claim.—The employment of rosin combined with potash, or soda and water, in preparing wool for spinning.

Duppa, Bryan Edward, of Malmaynes-hall, Kent, gentleman. *Improvements in colouring photographic pictures.* Patent dated November 3, 1853. (No. 2552.)

Claim.—Colouring photographic pictures, by applying colours to the surfaces which constitute the backs of the finished pictures.

Hindle, Peter, of Ramsbottom, Lancaster, manufacturer. *Improvements in power-looms for weaving.* Patent dated November 3, 1853. (No. 2554.)

Claim.—A double interrupted or varying taking-up motion, having a slow and quick taking-up action at any required intervals of space, the effect of which will be to produce thin and thick cloth alternately, and thus accomplish the weaving of transverse stripes in the cloth by the operation of a single shuttle, and of one and the same quality of weft-thread throughout.

Duncan, George and John Boyd, both of Liverpool, Lancaster, patent cask-manufacturers, and John Barker, of Knotty Ash, near Liverpool, doctor of medicine. *Improvements in casks, and in machinery or apparatus for the manufacture of casks.* Patent dated November 3, 1853. (No. 2555.)

The principal feature of this invention consists in the employment of corrugated iron, either alone or in combination with wood, in the manufacture of casks.

Goddard, Ebenezer, of Ipswich, Suffolk, gas engineer. *Improvements in gas-burners.* Patent dated November 3, 1853. (No. 2556.)

This invention relates to the construction of the regulating cocks of gas-burners, and consists in the employment of a differential burner, which is composed of a three-way cock, the plug of which is formed with two

apertures for supplying the gas to two distinct burners, which are fitted into the top of the plug itself.

SCOTT, JAMES, of Shrewsbury, Salop, carriage and wagon-inspector of the Shrewsbury and Birmingham Railway Company. *An improved apparatus for shifting carriages, wagons, engines, and other vehicles on railways and tramways.* Patent dated November 4, 1853. (No. 2558.)

This apparatus consists of two portable rails, which are kept in their proper positions by two bars, with a knee at one end, to take hold of the permanent rail, and with holes in the other end to allow the portable rails to extend to any distance that the wheels of the vehicle may have been projected from the permanent rail when thrown off the same by accident.

*** The documents of No. 2532 are still with the Law Officers under objection.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

M'NAUGHTON, WILLIAM, of Manchester, Lancaster. *Improvements in printing yarns or worsteds for weaving carpets; also in printing carpets, woollen, silk, cotton, and other textile and felted fabrics or fibrous substances.* Application dated October 27, 1853. (No. 2490.)

These improvements relate to a previous patent of the inventor's, dated April 18, 1853. and consist mainly in the use and application of hollow metal pattern cylinders, either separately or in combination with wood, instead of those formed wholly of wood, for printing patterns or devices or plain surfaces of colour upon yarns or worsteds for weaving carpets; also in printing carpets, woollen, silk, cotton, and other textile and felted fabrics, or fibrous substances.

LEMONNIER, JEAN MARTIN ADOLPHE BAYET, of Liège. *A new system of weaving by hand.* Application dated October 27, 1853. (No. 2491.)

This invention relates to methods of hand-weaving in colours. The apparatus employed is composed of a warping frame, a mechanical reader, and a loom. This loom differs from those usually made use of for weaving; first, in its batten, which is placed vertically, and the reed of which is often at top; second, in the substitution of flying for fixed warp; thirdly, in having hooks fixed at both extremities of the reed in which the flying warp is set; and, fourthly, in suppressing Jacquard apparatus, and other similar known mechanism.

LOYSEL, EDWARD, of Rue de Gretry, Paris, civil engineer. *An improved coffee-pot.* Application dated October 27, 1853. (No. 2492.)

This coffee-pot is constructed on the principle of the syphon, the water whereby the aroma and flavour of the coffee are extracted, being made first to percolate upwards through the mass of ground coffee placed in the bottom of the pot, and then by the turning of a cock to pass through the coffee a second time and down a pipe into a reservoir placed below.

THOMPSON, WILLIAM, of Clayton-street, Lambeth, Surrey, gentleman. *Instantaneously extinguishing conflagrations in ships' holds, warehouses, and other buildings.* Application dated October 28, 1853. (No. 2499.)

In applying this invention, a quantity of powdered chalk is to be confined in a vessel of peculiar construction, and placed in the hold of a ship, communicating with the deck by means of a metal pipe, down which is to be poured a quantity of sulphuric acid, previously purified from all nitric acid and nitrous oxide by means of sulphate of ammonia.

SMITH, EDWIN DALTON, of Hertford-street, May-fair, Middlesex. *An improvement in the construction of railway carriages, whereby, in the event of collision, the crushing of the carriages will be prevented.* Application dated October 29, 1853. (No. 2501.)

This invention consists in attaching a shoe to each of the carriages of a train in such manner, that when a collision takes place these shoes will have the effect of throwing the carriages off the rails alternately on opposite sides of the line, so that there will be the distance of a carriage between each, and thus the crushing of the carriages is to be prevented.

BERNARD, PETER OWEN, of Rood-lane, London, wine-merchant. *An improved case or hamper for carrying wines, spirits, and other liquids in bottle.* Application dated October 29, 1853. (No. 2502.)

This hamper is divided into compartments in which the bottles are laid in a horizontal position, and is fitted with flaps that close down when the hamper is in use.

GLADSTONE, GEORGE JOSEPH, of Brunswick-terrace, Blackwall, shipwright and surveyor of shipping. *Improvements in apparatus for ascertaining and indicating the depth of water in the hold of a ship or vessel.* Application dated October 29, 1853. (No. 2504.

This invention consists in employing a float in connection with a wire or rod within a tube descending into the hold. The lower part of the tube is formed so as to admit water freely, and in such manner that the water in the tube will be at the same level at all times as that in the hold, the height of which will therefore be indicated by the rod on a gauge at the upper end.

GÖETHEL, CHRISTIAN, and CHARLES MORITZ ZIMMERMAN, both of Philadelphia, United States. *Improvements in stereoscopes.* Application dated October 31, 1853. (No. 2510.)

These improvements in stereoscopes consist principally in forming them in three parts hinged together, so as to allow of the whole being folded up.

PECHOIN, CELESTIN, chemist, and EUGENE PECHOIN BARADES, soap manufacturer, both of La Chapelle, St. Denis, France. *Improvements in utilizing the saponaceous matters contained in the waste waters of woollen and other manufactories.* Application dated October 31, 1853. (No. 2519.)

In this invention the saponaceous matters are to be obtained from waste waters by pouring into them hydrate or sulphate of lime, by which means a soap of lime is precipitated.

BOTTOMLEY, JOHN, of Bradford, York, manufacturer. *Improvements in ornamenting textile fabrics.* Application dated November 1, 1853. (No. 2520.)

These improvements relate to that class of fabrics known as twilled, and figured, or quilted fabrics, which have hitherto been produced by the Jacquard loom alone, and consists in employing plain woven fabrics, and producing from peculiar engraved rollers by pressure, both the twilled ground, and the watered or plain quilting, or design.

HANSOR, JAMES, of Wandsworth-road, Surrey, chemist. *Improvements in the manufacture of illuminating gas.* Application dated November 1, 1853. (No. 2523.)

In manufacturing gas according to this invention, two retorts, or two chambers in one retort, are employed. The oil or other substance is partly decomposed and volatilized in one of these by the heat, and the products are conveyed into the second, where the decomposition is completed, and the whole or the greater part of the volatile products are converted into illuminating gas, which is conveyed away by a pipe, which dips into a vessel containing water, lime-water, or other purifiying liquid, and then passes to the gasometer: or the gas may, if necessary, be passed through other purifiers before entering the gasometer.

PALMER, WILLIAM RUSSELL, of New York, United States. *Improvements in the construction of spike thrashing machines, whereby all liability to and danger of accident in their use is removed and prevented.* Application dated November 1, 1853. (No. 2529.)

This invention consists in so constructing the cylinder that it is rendered as secure as may be against liability of bursting; in so inserting the spikes in it, that they will not be thrown out by centrifugal force, and the feed-board or hopper, that all foreign substances, which may be in the grain, shall be separated therefrom and discharged from the machine without being carried into it; and in placing a guard or roller before the cylinder.

HEYWOOD, JAMES, of Ratcliffe-bridge, Lancaster, dyer. *Certain improvements in machinery or apparatus for printing yarns.* Application dated November 1, 1853. (No. 2531.)

This invention relates to the process of printing yarns by hand, which, in this case, is performed by passing the rollers along longitudinal supporting rails under the yarns (which are distended in hanks crosswise), from one end of the frame of yarn to the other, thus printing any width or colour of stripe or pattern required, simply by suitably arranging the width of the retaining bars or strips and interposing the printing rollers between them.

ARCHBUTT, ROBERT, of King's-road, Chelsea, Middlesex, engineer. *Improvements in wood-cutting machinery.* Application dated November 1, 1853. (No. 2533.)

This invention consists in the employment of an endless travelling chain, which passes round a tumbler and carrier-pulley, for the purpose of feeding the baulks or slabs to the cutting mechanism.

TAYLOR, WILLIAM, of Newport Pagnel, Bucks, chemist and soda-water manufacturer. *Stopping of bottles containing aërated liquids.* Application dated November 2, 1853. (No. 2534.)

This invention consists of a stopper of metal, gutta-percha, ivory, wood, or any other hard substance, made hollow and plugged at the end, and perforated with holes about the middle of the cylindrical part of it, so as to allow of the passing off of liquids or gases. This stopper is to be surrounded with an elastic ring, made of India-rubber, and held by a ring of metal.

GILBEE, WILLIAM ARMAND, of South-street, Finsbury, London, gentleman. *An improved apparatus for levelling.* (A communication.) Application dated November 2, 1853. (No. 2537.)

In this invention two glass tubes are placed on stands, each of which is provided with a graduated scale, the divisions of which must begin at the bottom of the glass tubes. The tubes are closed air-tight at the top by stoppers, and are made to communicate with each other by a flexible pipe, made of caoutchouc, or other suitable elastic and water-tight material, fixed to the lower part of them. Coloured liquid being poured into one of the tubes, so as to fill up the flexible pipe, will become visible in the other, and the scale will show the

difference of the heights of the surfaces on which the stands are placed.

MALTBY, WILLIAM, of Camberwell, Surrey. *An improved system or arrangement for preventing collisions or accidents on railways.* Application dated November 2, 1853. (No. 2539.)

In this invention a piece of metal, of a hoop form, is placed between the rails, and being raised by the signal-man, causes certain levers, placed underneath the engine, to open the valves and allow of the escape of steam.

WILLIS, BRAND, and JOHN MUSTO, both of the East London Ironworks, Mile-end, Middlesex, engineers. *Improvements in rotatory pumps.* Application dated November 2, 1853. (No. 2540.)

This invention consists in the employment of a disc or fan, composed of a series of inclined blades or planes, which are fitted into a suitable boss, through which the main actuating shaft passes. This disc is driven at a high velocity within the pump-barrel by any suitable mechanical contrivance, and may be worked either vertically or horizontally, as required.

BUTTERWORTH, BENJAMIN, of Calder-Cottage, Caldershaw, near Rochdale, Lancaster, grocer. *Improvements in combining oil with other liquids for the obtainment of a new lubricating compound.* (Partly a communication.) Application dated November 2, 1853. (No. 2542.)

This invention consists in forming, for the sake of economy, a composition which will answer the same purpose as oil, by combining oil, by means of lime, with water, milk, or wine, or with two or all of these substances, but by preference with water alone.

WOOD, WILLIAM, of Chancery-lane, London, civil engineer. *Abstracting and condensing smoke arising from steam engines and other furnaces, and obtaining a supply of air for supporting the combustion of the fuel in such furnaces, thereby superseding the necessity of chimney-shafts and funnels.* Application dated November 3, 1853. (No. 2548.)

This invention consists in the employment of rotating fans working in a box, having a communication with the flue of the furnace by means of pipes entering at both sides of it, thereby producing a partial vacuum, and causing the necessary supply of air to rush through the furnace to support combustion; the centrifugal force of the fan is employed to force the smoke into water for the purpose of condensing it.

REEVES, CHARLES, jun., of Birmingham, Warwick, manufacturer. *An improvement or improvements in the manufacture of swords, bayonets, and sword-bayonets.* Application dated November 3, 1853. (No. 2550.)

This invention consists in certain methods of cutting out blanks of iron or steel to be converted into the articles enumerated in the title.

PATTERSON, WILLIAM, of Edinburgh, Scotland, cabinet-maker. *Improvements in chairs.* Application dated November 3, 1853. (No. 2553.)

This invention consists in a method of constructing folding chairs, in which the parts are fixed in their positions by means of thumb-screws passing through the front and back parts of the seat frame respectively, and into plates fixed in parts connected with the front and hinder legs respectively; the seat being inserted in its frame, and secured in the ordinary manner, by studs projecting therefrom at the back and front parts of the said frame.

TUCK, JOSEPH HENRY, of Pall-mall, Middlesex, engineer. *Improved machinery for obtaining and applying motive power, and for raising and forcing fluids.* Application dated November 3, 1853. (No. 2557.)

This invention relates to a novel construction of rotary engine, the chief peculiarity of which is, that the rolling piston has an axial motion, independent of that of the main shaft, and consists of a cylinder with open ends. It is inserted in a fixed circular case and packed at its ends.

PROVISIONAL PROTECTIONS.

Dated December 15, 1853.

2911. Aignan Bernard Callier, of Paris, France. Certain improvements in the manufacture of umbrellas and parasols.

Dated March 11, 1854.

594. James Jones Aston, of the Middle Temple, London, and of Preston, Lancaster, barrister-at-law. Improvements in the construction of envelopes.

Dated March 24, 1854.

695. John Jeyes, of Northampton, merchant. The manufacture of pulp from twitch or couch grass.

Dated March 31, 1854.

741. Alfred Augustus de Reginald Hely, of Cannon-row, Westminster, Middlesex, civil engineer. Certain improvements applicable in exhibiting artistical, natural, or other objects, on a large scale.

Dated April 5, 1854.

786. George Francis Wilson and James Monroe Whiting, of Rhode Island, United States of America. Improvements in the manufacture of wood screws.

Dated April 6, 1854.

795. James Edward Boyd, of Lewisham, Kent, gentleman. Improvements in the construction of ships' anchors.

Dated April 7, 1854.

804. Thomas Williams, of Manchester, Lancaster, storekeeper, Samuel Ainley, of Oldham, in said county, mechanic, and Moses Mills, of the

same place, agent. Improvements in machinery or apparatus for spinning cotton, wool, flax, or other fibrous materials.

Dated April 19, 1854.

905. Richard Archibald Brooman, of 166, Fleet-street, London, patent-agent. Improvements in separating substances of different specific gravities, and in machinery employed therein. A communication.

Dated April 21, 1854.

923. Aimé Blavier, of the Chemin-de-fer de l'Ouest, Boulevard Mont Parnasse, Paris. Improvements in locomotive engines.

Dated April 24, 1854.

933. David Buddo, of St. Andrew's, Fifeshire, surgeon. A magnetic weather-gauge to give warning of the approach of gales and storms, &c.

935. Moses Poole, of the Avenue-road, Regent's-park, Middlesex. Improvements in washing garments and fabrics. A communication.

937. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improved machinery for casting type. A communication.

939. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. The application of a new or improved material or substance to the construction of certain parts of machinery. A communication.

940. Thomas Weatherburn Dodds, of the Holmes Engine and Railway Works, Rotherham, York, engineer. Improvements in furnaces and fire-places for effecting a more perfect combustion of fuel and prevention of smoke.

941. Jonathan Davidson, of Edinburgh, Mid-lothian, machine-maker. Improvements in breakwaters.

942. William Blackwood, of Arthurlie, Renfrew, bleacher. Improvements in the treatment and finishing of threads or yarns.

Dated April 25, 1854.

943. Richard Ford Sturges, of Birmingham, Warwick, manufacturer. An improvement or improvements in joining metals.

945. Felix Alexandre Testud de Beauregard, civil engineer, of Paris, France. Certain improvements in the manufacture of inks, and in the preparation of papers for receiving the same.

946. William Collier, of Weston, Chester, chemist. Improvements in evaporating-pans for concentrating solutions of certain acids, alkalies, and salts.

947. Richard Ellis, of the parish of St. James's, carpenter, and James William Martin, of same parish; Westminster, cooper. Improvements in the mode of drying or desiccating by the agency of atmospheric air.

948. John Aitken, of Douglas, Lanark, engineer. Improvements in sawing-machinery.

949. John Lawson and Somerville Dear, both of Leeds, York, machinists. Improvements in looms for weaving.

950. John Goucher, of Worksop, Nottingham, machine-manufacturer and ironfounder. Improvements in propelling ships and other vessels.

Dated April 27, 1854.

951. Charles Cléophas Person, Knight of the Legion of Honour, of Paris, France. Certain improvements in coating with zinc by galvanization.

952. Edward Crosland, of Rochdale, Lancaster, manager, and Thomas Boardman, of Westhoughton, in the same county, weaver. Improvements in weaving, and in machinery for manufacturing cut pile and other fabrics.

953. Thomas Griffith Owen, of Shrubland-road, Dalston, Middlesex, architect. An improved construction of portable filter.

954. William Gravatt, of Park-street, Westminster, civil engineer. An improvement in propelling ships and other vessels.

956. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in polishing and flattening metal plates. A communication from Henry Beaud, of Paris, France, manufacturer.

958. Henry Clarke, of Lincoln. Improvements in fire-arms and ordnance.

959. Richard Green, of Sydney-street, Brompton, Middlesex. Improvements in propelling vessels.

960. Joseph Barling, of High-street, Maidstone, Kent. Improvements in treating the hop bine, and rendering it applicable to the manufacture of paper and other articles.

961. Frederick Woodbridge, of Green's-terrace, Lower-road, Rotherhithe, Surrey. Improvements in furnaces.

Dated April 28, 1854.

962. Andrew White Gibson, of Edinburgh, Scotland, miller. Improvements in mills for the manufacture of barley and rice.

963. William Littell Tizard, of Aldgate, London, engineer. Certain apparatus for roasting and calcining ores and minerals, and separating metals therefrom, which apparatus is in whole or in part applicable to the drying and roasting of malt and other vegetable substances.

964. John Evans, of Abbots Langley, Hertford, paper-manufacturer. A new manufacture of paper.

965. James Heywood, of Ratcliffe-bridge, Lancaster, dyer. Improvements in machinery or apparatus for printing yarns.

Dated April 29, 1854.

966. Alexander Mills Dix, of Salford, Lancaster, brewer. Improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.

967. Benjamin Dixon, of Birmingham, Warwick, schoolmaster. An improvement or improvements in the joints of measuring-rules.

968. Jean Philippe Variet, mechanic, of Paris, France. Improvements in obstructing the holes produced by accidents or projectiles in the hulls of ships and boats.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May 16th,* 1854.)

2870. Gideon Morley. Ornamenting or producing pictures or japanned goods, panels, canvas, or other material, whereby a vast amount of artistic skill and labour is superseded.

2911. Aignan Bernard Callier. Certain improvements in the manufacture of umbrellas and parasols.

2924. Thomas Williams. An improved revolving pistol.

2935. Henry Thomsen. Improvements in machinery or apparatus for stretching textile fabrics as they are wound into laps or rolls after the processes of bleaching and dyeing, or operations connected therewith.

2971. John Jones. Improvements in propelling vessels.

2979. Thomas Berry, James Mangnall, and John Chadwick. Improvements in winding and twisting wool, cotton, and other fibrous materials.

2990. Joshua Margerison. Improvements in railway brakes.

3031. Henry Vernon Physick. Improvements in electric telegraphs, and apparatus connected therewith.

15. John Isaiah Grylls. An improvement in

whelps for the barrels of capstans, windlasses, and other machinery.

32. John Radcliffe. Certain improvements in power looms for weaving.

43. John George Taylor. Improvements in writing-apparatus.

90. Thomas Bennett Foulkes. Improvements in the manufacture of self-adjusting gloves.

104. Joseph Spires. Improvements applicable to boots and shoes.

121. Edmund Sharpe. Improvements in the apparatus used for sifting clay.

129. John Norton. Improvements in effecting communications between the different parts of railway trains.

137. Henry Bollmann Condy. Improvements in the manufacture of sulphate of soda, sulphate of potash, and other sulphates, and in the manufacture and employment of muriatic acid.

149. John Westerton. An improvement in the manufacture of night-light boxes or cases.

151. Herman Eugene Falk. Improvements in preparing or manufacturing salt.

156. Andrew Shanks. Certain improvements in machinery for punching and shearing metals.

170. Peter Armand Lecomte de Fontainemoreau. Improvements in the preparation and combination of fatty and resinous bodies and vegetable and other wax, for the manufacture of candles, also in the preparation of a wick to be used for the same. A communication.

176. Jean Baptiste Moinier. A new chemical process for the production of sulphates of soda, potassa, and alumina, of nitrates of soda and potassa, of soap, and of hydrochloric, sulphuric, stearic, margaric, and elaidic acids.

246. Claude Bernard Adrien Chenot. Improvements in accumulating, conducting, and treating gases of combustion, and also in generating and applying the same to metallurgic and other purposes.

259. Joseph Beattie. Improvements in furnaces, and in the treatment of steam.

461. George Collier. Improvements in twisting fringes of shawl and other fabrics.

594 James Jones Aston. Improvements in the construction of envelopes.

672. John Sheringham. Improvements in the construction of kettles and other like domestic utensils, and in the means of supporting or retaining the same in proper position when in use.

786. George Francis Wilson and James Monroe Whiting Improvements in the manufacture of wood screws.

804. Thomas Williams, Samuel Ainley, and Moses Mills. Improvements in machinery or apparatus for spinning cotton, wool, flax, or other fibrous materials.

826. Thomas Bromley. Improvements in the manufacture of soap.

849. John Johnson Peile. An improved construction of lifting-jack.

858. Robert Whiteside. Improvements in treating or purifying wheat and other grain.

859. William Coltman. An improvement in knitting-frames.

894. Henry Hucks Gibbs. Improvements in the manufacture of nitrate of soda. A communication from Pedro Gamboni.

905. Richard Archibald Brooman. Improvements in separating substances of different specific gravities, and in machinery employed therein. A communication.

907. Edmund Hunt. Improvements in treating minerals for the extraction of their valuable metals.

910. Henry Brown. Improvements in combing wool, hair, cotton, and other fibrous materials.

923. Aimé Blavier. Improvements in locomotive engines.

927. Thomas Freman Finch. Improvements in the manufacture of buttons.

931. James Warren. Improvements in the construction of railways.

935. Moses Poole. Improvements in washing garments and fabrics. A communication.

937. William Edward Newton. Improved machinery for casting type. A communication.

938. James Combe. Improvements in machinery for hackling flax and other fibrous substances.

940. Thomas Weatherburn Dodds. Improvements in furnaces and fire-places for effecting a more perfect combustion of fuel and prevention of smoke.

941. Jonathan Davidson. Improvements in breakwaters.

961. Frederick Woodbridge. Improvements in furnaces.

962. Andrew White Gibson. Improvements in mills for the manufacture of barley and rice.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

NOTICE OF APPLICATION FOR PROLONGATION OF PATENTS.

A petition will be presented to Her Majesty in Council by Charles Payne, of No. 10, Upper Kennington-lane, in the county of Surrey, gentleman, praying Her Majesty to grant a prolongation of the terms of the several letters patent granted to the said Charles Payne for England, dated the 13th October, 1840; for Scotland, dated the 11th November, 1840; and for Ireland, dated the 25th day of March, 1841, respectively, for "certain improvements in salting animal matters." On the 22nd June (or on the next day of sitting of the Judicial Committee of Her Majesty's Privy Council, if it do not sit on the day mentioned), an application will be made to that Committee to fix an early day for the hearing of the matters contained in the said petition; and any person desirous of being heard in opposition, must enter a caveat to that effect in the Privy Council-office on or before that date.

WEEKLY LIST OF PATENTS.

Sealed May 12, 1854.

2627. William Austin.
2629. William Austin.
2634. Henry Willis.
2642. John Josias Catterson.
2882. Edward Green.

1854.

233. Thomas Hollingsworth.
279. James Boydell.
483. William Simpson.
529. Felix Abate.
563. George Thomas Selby.
585. George Appolt and Chas. Appolt.

Sealed May 16, 1854.

2656. David Pratt.
2657. John Ferguson.
2661. George Carter.
2666. John Banfield.

2669. Thomas Bourne.
2681. Jean Baptiste Clavières.
2691. William Austin.
2712. Robert Adams.
2729. John Drumgoole Brady.
2796. Joseph Dilworth.
2798. John Henry Johnson.
2837. Julian Bernard.

1854.
17. Julian Bernard.
33. John Healey.
62. Ambroise Auguste Masson.
102. George Fergusson Wilson.
183. John Bird.
236. Isaac Hazlehurst.
326. James Young.
442. William Ryder and James Ryder.
489. John Thomas Way and John Manwaring Paine.
511. Andrew Barclay.
523. Joseph Bour.
530. Herman Dirs Mertens.
590. Willoughby Theobald Monzani.
637. Rice Williams Harris and Thomas Patstone.
696. William Wood.
700. Walter Neilson.

Sealed May 17, 1854.

2665. William Ashton.
2670. Augustus Johann Hoffstaedt.
2684. John Harcourt Brown.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

A.—We should be happy to comply with your request, if it were not unadvisable to reopen the controversy in which your letter resumes a part.

A Reader.—No description of a patented invention can be obtained (except from the patentee himself) until the final specification of it is filed. It is not, therefore, made public during the time it is open to objection.

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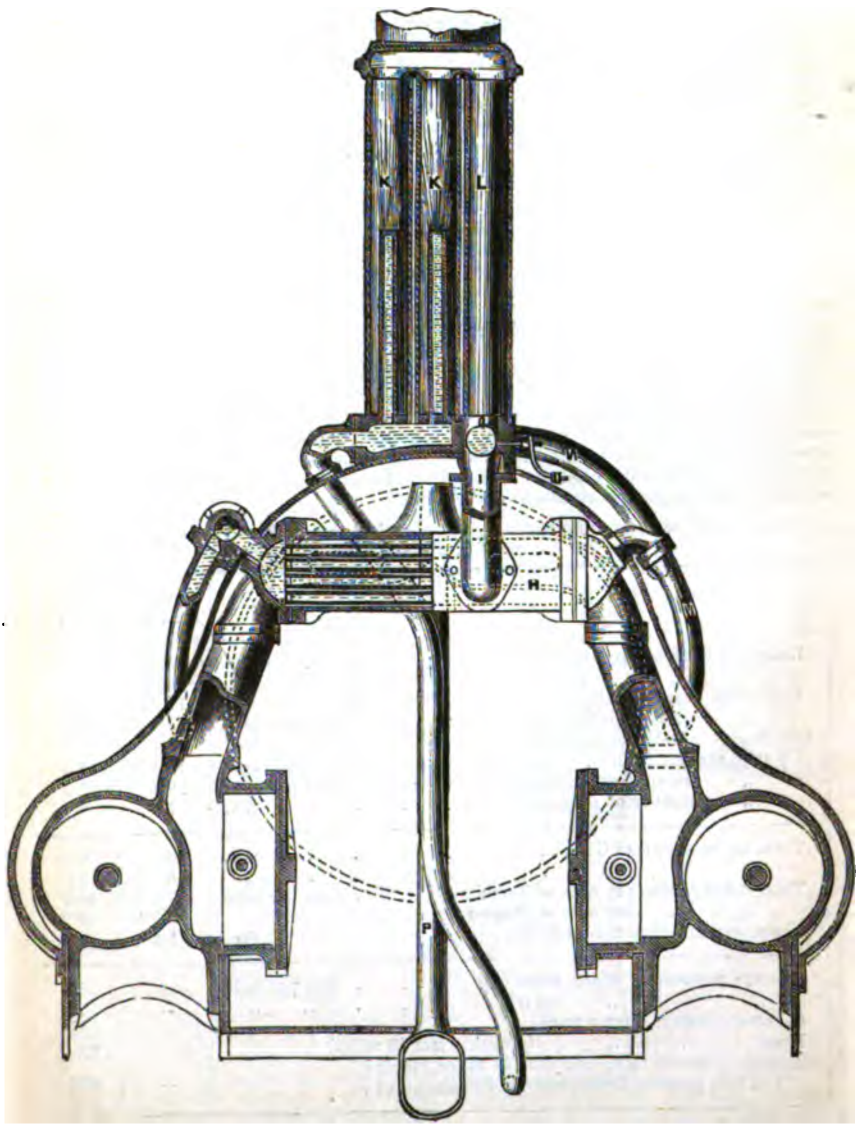
Mechanics' Magazine.

No. 1607.] SATURDAY, MAY 27, 1854. [Price 3d Stamped 4d.

Edited by R. A. Brooman, 166, Fleet-street.

BEATTIE'S IMPROVED LOCOMOTIVE ENGINE.

Fig. 1.



BEATTIE'S IMPROVED LOCOMOTIVE ENGINE.

(A Paper read at the Institution of Mechanical Engineers, by Mr. Joseph Beattie, of London.)

The economy of fuel in working locomotive engines is a subject of great importance to railway companies, and has attracted considerable attention for many years; but at no period since the introduction of railways has this subject been of such moment as at the present, by reason of the great demand for coal, and consequent increase of price.

The writer having been connected with one of the metropolitan railways for many years, and coal being so very expensive in the south, was led to the consideration of economy in fuel and the production of steam at the lowest possible cost, the accomplishment of which appeared to be in the employment of coal to be used in a separate and distinct fire-box, but in connection with the coke fire-box of the locomotive engine; and this idea was strengthened by the observation of the working of coke-ovens in the manufacturing of coke, where he often lamented to see the great amount of flame and combustible gases pass off into the flues and chimney without producing any useful effect; and when it is remembered that 1¼ tons of good coking coal is required to produce one ton of coke, some estimate may be formed of the quantity of combustible gases that is thrown off.

Being anxious to secure the advantages which appeared to be got by the use of coal in connection with coke in the generation of steam, the writer considered the proper mode was to use coal and coke in separate furnaces, so arranged that the flame and combustible gases thrown off the coal fire would enter into and pass over that of the coke fire, and entering by short tubes into a combustion chamber, situated partly central between two sets of tubes in the cylindrical portion of the boiler, and where complete combustion would be effected.

A new engine on this principle has not yet been completed, but it has been applied in part to six engines, with the ordinary boiler, on the London and South Western Railway, and the results of working have been found most satisfactory. One of them, the "Britannia Engine," with 15-inch cylinders, 21-inch stroke, and 7-feet driving-wheels, has been working since August, 1853, and run 13,600 miles between Southampton and London, a distance of 78¾ miles, taking the regular running of passenger trains; the average consumption has been 17 lbs. per mile, one-third of which was coal, but charged in weight as coke. An experimental trip was made with this engine by Mr. Edward Woods, in October last, with one of the passenger trains to Southampton, and back to London; and another experimental trip was made by Mr. W. P. Marshall, Secretary of the Institution, on the same engine, with the 10·15 A.M. mail train from London to Southampton, on the 17th inst., returning with the 3·0 P.M. train to London; the particulars of these experiments are appended, and the general results are as follows:

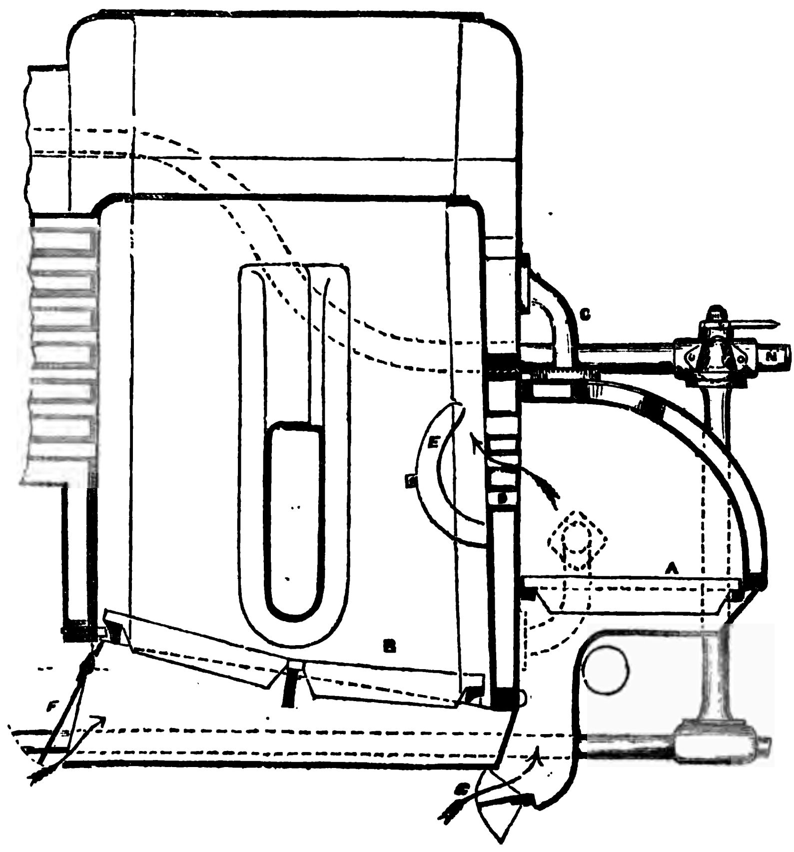
Experiments with the "Britannia" Engine with Passenger Trains, from London to Southampton and back.

		1853. Oct. 26.	1854. Jan. 17.
Length of double trip, with Train	miles,	157½	157½
" " " Engine	"	161½	161½
Down trip, average train	carriages,	12·8	11·2
" average speed running	miles per hour,	31·4	28·3
" number of stoppages	No.,	8	8
Up trip, average train	carriages,	18·5	19·3
" average speed running	miles per hour,	29·4	27·5
" number of stoppages	No.,	7	7
Total consumption of Coke	cwt.,	16	18
" " Coal	"	8	8½
Total consumption per mile of Train	lbs. per mile,	17·1	18·6
" " per mile of Engine	" "	16·7	18·2
Water evaporated per lb. of fuel	lbs.,	8·3	8·1
Average pressure of steam, down trip	lbs. per mile,		105
" " " up trip	" "	..	100
Greatest pressure during trips	" "	..	128
Least " " " (omitting last 10 miles)	" "	..	82
Average pressure in up trip over 17 miles, rising 1 in 250, between Bishopstoke and Basingstoke	" "	..	122

The action of the coal and coke fire-boxes is as follows;

The coal fire-box, A A, fig. 2, is attached to the back of the fire-box, B B, of the ordinary locomotive engine, and placed partly below the foot-plate, the water space of which is in connection with that of the coke fire-box by two branch pipes, C C, at bottom, and two at top. The flame and combustible gases thrown off the coal fire pass into the coke fire-box through tubes, D D, inserted into the intervening water space; and to promote the combustion of the gases, by giving more time for better admixture, a curved fire-tile bridge, E, forming a sort of combustion chamber, is placed within the coke fire-box, fronting the tubes leading from the coal fire-box, thereby checking the velocity of the flame in its pas-

Fig. 2.



sage over the surface of the coke fire. The coal fire-box and the coke fire-box are provided with separate ash-boxes and close-fitting dampers, F, G, whereby the draught to each can be regulated with the greatest nicety, and independent of each other. The damper of the coke fire-box, F, is generally kept nearly closed, and is only opened about 1½ inch with trains of 20 to 24 carriages; but the damper of the coal fire-box, G, is generally kept *quite* open, to admit the *full draught* of the blast, by which means, the coal fire being excited to the utmost, the gases and flame pass into the coke fire, and with them the air in a *heated* state; the high temperature of the coke fire is maintained, and more perfect combustion is the result. The combustion of the smoke is completely effected, the smoke being scarcely perceptible. An important practical advantage is gained from the circumstance of the ordinary coke fire-door being kept almost constantly closed, the door being opened only three times to put on coke during the whole trip of 78¾ miles, thus preventing the frequent rush of cold air cooling the fire-box and tubes, and causing a liability to leakage: in the

present case, all the air entering at the coal fire-door, becomes highly heated before coming in contact with the main fire-box and tubes.

The next subject which attracted the author's attention was the fact that all the water required for the supply of the engine when working was sent cold into the boiler, and to obviate this evil, attempts were made to warm the water in the tender by steam from the boiler *before* the engine started to work; but this was obtained at the *expense* of the fuel, and was only available as far as the first quantity of water in the tender would supply the engine. The next supply of water taken into the tender must be used cold, because the engine being *on the journey*, could not afford to part with steam to heat the water, as in the first instance before starting. The great evil of frequent loss of time in travelling was a consequence of the cold-water system of working, and so much was this felt, that when an engine was heavily loaded and taxed to her *utmost capability*, and having to ascend a long steep gradient, the extra steam to be generated to accomplish this task, necessitated an extra supply of *cold* water to be pumped into the boiler, thus checking the generation of steam, reducing the pressure in the boiler, and crippling the engine. This evil being so great, the author attentively reviewed the whole action of the engine, with a view to improvement as well as economy; seeing that nearly the whole of the caloric which had cost so much was finally dismissed as useless at the chimney, it occurred to him that part of such caloric might be intercepted and communicated to the cold water used for supplying the boiler, a source of heat being thus available.

Various apparatus for this purpose have been contrived and put in operation, one of which is attached to the "Britannia" engine. It consists of an oblong rectangular chamber placed in the smoke-box, and cast in one piece with the exhaust-pipe, and communicating to the upper part of the ordinary blast-pipe; this chamber is filled with a series of small tubes, fixed in tube-plates at each end, and communicating with inlet and outlet chambers in connection with the engine, pump, and boiler. A branch pipe from this rectangular chamber communicates with an outer condensing apparatus fixed in front of the chimney, consisting of three upright pipes, K K L, fig. 1, standing on a cast-iron foundation, and connected at top by a hollow cap. Two of these pipes, K K, are provided with jets or injections supplied by the cold-water pump, which draws its supply direct from the tender. There is an overflow-pipe, M, for conveying the water after it is heated to the hot-water pump, and an overflow-pipe, N N, leading into the tender to convey any surplus water which may not be taken by the hot-water pump. The third upright pipe, L, is provided with a disc or throttle-valve, O, by which the exhaust steam from the lower chamber, H H, can be admitted into the condenser. P P is an air-pipe inserted in the centre of the orifice of the blast-pipe, with a funnel-shaped mouth at the lower end, to catch the air and assist the blast.

The action of the apparatus is as follows:—When the engine is working, the exhaust steam from the exhaust steam pipe, before it reaches the orifice of the blast-pipe, fills the lower chamber, forming a steam bath around the small tubes (through which the water passes into the boiler), and flows upwards into the outer condenser, where it is condensed by the jets from the cold-water pump, and such water, together with that obtained from the condensed steam falling to the bottom of the condenser, is carried off by the overflow-pipe before named to the hot-water pump, which propels it through the small tubes in the lower chamber; and as the water passes slowly through these pipes on its way to the boiler, it absorbs heat from the constant supply of steam rushing to the condenser to be condensed, and enters the boiler at a very *high* degree of temperature, and causing little or no check to the generation of steam in the boiler, thereby maintaining the *full power* and energy of the engine. The average pressure in the experiment throughout the whole down trip was 105 lbs., and 100 lbs. in the up trip; the total fluctuation in pressure during the trip being very limited.

This is a desideratum of no small value, and is experienced especially in the working of the engine between Southampton and London, as there are many long and sharp gradients, particularly that between Bishopstoke and Basingstoke, the gradient averaging 1 in 250 for 17 miles; the Southampton, Portsmouth, Gosport, and Salisbury trains, being all joined at Basingstoke, and taken in one train to London, which generally contains from 20 to 26 carriages. The advantages of the improvements just described are particularly apparent whilst ascending this long gradient, as was shown in the experiment last referred to, in which a uniform pressure of 120 lbs. per square inch was maintained up this incline of 17 miles 1 in 250, with a load of 21 carriages; in consequence, a high rate of expansion could be employed throughout, the steam being cut off at 5 inches out of 21-inch stroke, or at less than one-fourth of the stroke during the whole time, an important source of economy.

There are six engines, adapted for burning coal and coke upon this principle, working on the London and Southampton line (the "Britannia" being one of them), whose united running amounts to 100,360 miles, and the average consumption of fuel, coal and coke together, has been 15·6 per mile, the "Britannia" having run 13,600 miles with an average

consumption of fuel of 17 lbs. per mile. In conclusion it may be remarked that in *no one* instance have any of these engines failed in *any* part of the apparatus connected with these improvements; also the same remark applies to the fourteen other engines (although in daily use) which are furnished with the heating and condensing apparatus. Should any mishap occur, the engine-driver can cut off the communication from the heating apparatus in an instant, and supply the boiler and work the engine in the ordinary way, and without stopping the train.

THE CRYSTAL PALACE AT SYDENHAM.

But a few days have passed since we beheld the Sovereign of these realms solemnly launching forth the mightiest of those mighty war-ships that are to vindicate, in the existing struggle, the honour of our own land and the security of others. But a few days will again pass, and we shall see her with equal solemnity dedicate to her nation the crowning triumph of the peaceful period that has just passed from it. The occasions are worthy of each other; and we cannot but hope that the multitudes whose enthusiasm was kindled by the former scene, will witness the latter with equal ardour. For in the midst of the turbulence of the time, it must not be forgotten that, to a nation like this—a nation great in art, in science, in industry, as well as in naval and military prowess—the successes of peace are not less dear than the victories of war. Indeed it may justly be affirmed, that the triumphs of arms lose all their legitimate glory when they tend not to restore and establish the influences that flourish in pacific times. The advancement of the world is the one desirable end, and war is honourable only as it ministers to this. The demolition of Cronstadt, or the reduction of Sebastopol, were to be rejoiced over only because we believe that either event would weaken a power that is inimical to the growth of that spirit of progress which blossoms into Industrial Exhibitions and People's Palaces. The edifice on Sydenham heights may, therefore, be taken as the symbol of what England, we trust, is battling for.

From a very early period the world has been pretty largely sprinkled with palaces, and yet the structure soon to be inaugurated is by no means deficient of interest. However viewed, it presents unique and striking features, and contrasts curiously and pleasantly with the famous palaces of antiquity. This will at once be seen, if we for a moment recall the memory of the most renowned of them all—that erected in Rome in the first century. Encompassing, according to Pliny, the whole city, it was sumptuously adorned with all things exquisite and rare. Gold and precious stones glittered in its walls, and the roofs of its halls were decorated with firmaments, in which stars and planets perpetually revolved. Through it streamed music and perfumes, and about it spread luscious orchards, voluptuous gardens, gorgeous woods, and gleaming lakes. Whatever the world possessed of things costly and luxuriant were there. But then its origin was the lusts, and its object the indulgence of the revelling Nero—the destroyer of the first Christians, and the slayer of Lucan and Seneca. And in the presence of the Crystal Palace, that is destined to foster industrial arts and social progress, we may well ask what nurture these ever received in the tyrant's Golden House? But we will not dwell on the comparison, since none of us need historical illustrations to inform us that until these days palaces have not been reared by nations for their own culture and elevation. The period for witnessing their erection for such purposes has now, however, arrived, and with it has brought honour to this land; and, in our judgment, Victoria, seated in Her People's Palace, will be a nobler sight than was ever beheld in the ages when representations of debased peoples, harnessed to the chariots of despotic princes, were universally deemed the most fitting ornaments of palaces and temples. It will show how great a distance slow, successive steps have borne us, and in it England will strike, before all nations, a sublime and lasting contrast between the ancient and the modern — barbarism and civilization — the shame and the glory of the race.

It is but two years since the Crystal Palace Company was registered, and yet the building is already erected, larger in all its proportions, more durable in its construction, and more magnificent in its appearance than the famous Hyde-park structure. Within it the treasures of nature, industry, and art are rapidly accumulating, and without it the rugged slopes are almost magically changing into a modern Paradise, to be adorned with sumptuous shrubberies, high-streaming fountains, superb terraces, and flower-built temples, forming a rich and splendid picture amid the luxuriant scenery

of Kent and Surrey. The new building is erected upon a massive brickwork basement, and instead of the various expedients resorted to in that of 1851, for partitioning the ground floor into the several departments, brick-built walls are now erected, not only for the Assyrian, Egyptian, and other palaces, but also for the courts in which are to be exhibited the products of British manufacturing skill. From the distance, the superiority of the present to the former structure, both in design and dimensions, is strikingly apparent in the beautiful arched nave, and in the three huge transepts, soaring high above it, on which the spring sunlight now dances daily from morning until evening. But when the spectator looks up to the Palace from the ornamental grounds on the northern side of it, the extent of the improvements effected is further seen in the elevation of the entrances, which are now approached by noble flights of steps, and in the deep recession of the ends of the transepts which produces those depths of shadow that always augment the grandeur of such colossal edifices. The new building has also two additional wings which, stretching out from its extremities, flank two broad and splendid terraces that overlook the garden grounds. Nor are the arched nave and the three transepts without their effect on the interior of the building, but here also serve greatly to augment its beauty. There are few, indeed, who could imagine anything more charming than the internal aspect which the Palace itself will present when all its decorations are completed—when the delicate trailing plants of all climates shall have twined their flowering lengths about the painted iron pillars, and blossoming festoons shall stretch from girder to girder, while through wall, and nave, and transept, the bright summer light shall descend and glow on gorgeous flowers and emerald verdure. Surely our countrymen will come from far and near to stand in this their Palace, which will vie, in the vastness of its luxuriance and splendour, with all that even the voluptuous East has ever bestowed upon its most prodigal princes.

But we must not enlarge upon the building and its decorations, since so much within and around it claims our consideration. The object of the projectors of the new Palace has been, as we have before intimated, to give their undertaking an essentially educational character. It is this fact, and this alone, that renders their enterprise a subject of national interest and gratulation. The promise of a splendid spectacle only would take but little hold of the people of this country. With no other charm than this, the World's Exhibition of 1851 would itself have proved a gigantic failure. The English temperament is well known to be discouraging to *fêtes*. We do not like to labour hard and spend capital in order simply to amuse ourselves. Without the prospect of something solid, something remunerative, we never get exalted far beyond a state of exceedingly drowsy enthusiasm. Therefore it has been wisely determined that the halls of England's permanent Palace shall be devoted to instruction, not to festivity. And by this arrangement (if it be wisely carried out) its founders have, we are persuaded, commanded success. In an age and nation aspiring after Knowledge, they have reared a Seminary in which it shall be communicated in elaborate and impressive lessons. Unsparing of labour and capital they have brought into their service the genius of all ages. From buried Nineveh, from desolated Thebes, from entombed Pompeii, they have called up the architect, the sculptor, the painter, to speak through winged lion, and solemn sphinx, and brooding angel. The builders of Persepolis and of the Parthenon, of the Arch of Titus and the Temple of Neptune, of the Roman Forum and the great Alhambra, will repeat their lessons to this generation. The greatest works of Greek, Roman, Byzantine, Renaissance, and modern art will be there, collected from galleries, museums, churches, cathedrals, and the palaces of foreign kings; and in these history will be epitomized. So that in the Crystal Palace thousands probably will acquire more real historical knowledge than they ever before possessed. To pictorial teaching we are all indebted, more or less unconsciously, for what we best know. But none of us have ever had advantage of it in the comprehensive form in which it is there to be conducted. With what facility and interest will men, for example, improve their knowledge of that ancient and mighty kingdom of Assyria, which, planted before Abraham was, fell before Isaiah prophesied, when they stand, as it were, in the very audience-chamber in which Sennacherib and Sardanaplus have often stood, and look upon the throne on which they sat, and pass out between the winged monsters by which they strode when sallying forth to make their conquests or returning to their palace flushed with victories! And will there be no healthy awe awakened in the minds of the ruder people as they learn that the halls in which they stand were reproduced from a city that lay for centuries entombed beneath barren plains, while generation after generation came and passed away, hearing indeed of its traditional existence, but possessing no memorial of the place where it had stood. Or, again, how truly and pleasantly will the historical student familiarise

himself with the life led by the Romans in the first century by a visit to the little Pompeian villa dug up from the heaps piled on it by the terrible Vesuvius! What a vivid conception will he acquire of the tastes and habits of the people of that place and period as he looks admiringly upon the richly-painted walls of that sea-coast cottage, or the altars of the guardian deities to whom the residents burnt their incense and proffered their offerings!

But the method of pictorial teaching is not to be confined to history and antiquities. The terrestrial forms and aspects of nature will also be abundantly represented. Scenes from every country and every clime will be reproduced with their appropriate inhabitants, climates, vegetation, and animals. The men and women of every race will appear habited in their accustomed garments and furnished with implements of war, husbandry, or manufacture, according to their general calling, and surrounded with the plants and animals common to their country. Thus, for instance, we shall probably see the savage of Australia moving among the tree-like ferns on which are perched the parrot and the cockatoo, while the yellow-bodied snake is seen to nestle near the kangaroo that sits in the distance. Or the lurking Indian will scent his prey through the dusky cedar swamps, or the broad pine-barrens where the terrible rattlesnake lies coiled and the bellowing bison seeks the herd. Or perchance the Bedouin will anxiously tend his little crop of barley springing up in the midst of the desert, while the camel browses on the scanty shrubs that break through the sands over which the dismal jackal wanders. The beauty of all this may well be imagined beforehand; but the advantages which the perpetuation of temperate and genial climates within the walls of the Palace will offer cannot be perfectly appreciated until their salutary effects are experienced. When London is beset by frosts, and the hills of Kent are wrapt in snow, here the delicate will often repair and spend their hours in delicious avenues, breathing the sweet atmosphere of summer amid the odours of budding lilies and blowing roses.

Returning, however, to the educational character of the new Palace, we may remark that there is another subject, in elucidation of which pictorial teaching will play a part probably more important than any to which we have yet referred. There are but comparatively few of the inhabitants of those English towns which are situated far from the shores of the sea, who know, or, knowing, who reflect upon the fact that those places where corn now waves, and orchards blossom, and cattle find pasturage, may have been, and probably once were, the beds of rivers or seas, or shores on which the ocean rose and fell. Persons unacquainted with the discoveries of geologists might be expected to exhibit some incredulity when told that certain impressions, visible on blocks of solid rock, were produced by the rippling waters of an ancient sea, and by the footfalls of animated beings that took their way along its shores ages before the creation of the first man, and even before that cycle of the earth's existence to which the race of man belongs. To remove the causes of this incredulity, and to inculcate the lessons that have grown out of geological studies, will be one of the great undertakings of the managers of the Crystal Palace. At the bottom of the grounds before the Palace, the antique world is to be exhibited. In it the earliest discoverable condition of the planet will be depicted, and from that state it will be traced through its subsequent stages by means of the fossil remains that have been deposited in its strata at successive epochs. The extinct races of animals will be represented by life-size models placed in their appropriate elements and attitudes, constructed in some instances from a few fossil limbs only, which, however, in the hands of Owen and others, have been sufficient for the recreation of the entire animals. Some idea of the magnitude of many of these antediluvian monsters may be obtained from the fact that in the mould of one of them, the Iguanodon, upwards of twenty persons have been entertained to dinner by the gentlemen to whom the task of constructing the casts of them is assigned. There can be no doubt concerning the impetus which will be given to geological studies by this branch of the Company's arrangements. Hitherto, the general student has been compelled, after long-continued attention to the matter, to be content with the best conception of pre-Adamite creatures that he could form for himself, scarcely knowing how much of fancy entered into his clearest realizations of them; and this uncertainty, added to the great obscurity of the subject itself, has checked many in the progress of their investigations, and debarred others altogether from the pursuit. But, with the opening of the Palace, all this will be changed, at least in the case of those who reside in or near the Metropolis; and we may further hope that the production of the gigantic models for the Sydenham Exhibition will be, as has been suggested, the first step towards a general distribution of smaller ones throughout the educational institutions of the country, in order to aid as much as possible the cultivation of a science which is naturally expected to supply hereafter

very large and important additions to the domains of knowledge.

Another class of students that will find the Crystal Palace a splendid place for pursuing their favourite avocations, consists of those individuals who derive their lessons from skulls and countenances. The phrenologist and the physiognomist will, indeed, reap a rich harvest of observations from the almost innumerable concourse of specimens there collected. Either may stand surrounded by busts of the great of all time, grouped into classes, and arranged chronologically. Poets, warriors, statesmen, wits, musicians, artists, queens and kings, will dwell there patiently from day to day, submitting themselves unmurmuringly to the examinations and criticisms of all comers. Surely with such opportunities, open to all, we shall not long be left to doubt concerning some of the open phrenological questions that at present occasion so much controversy.

The new Palace will possess one feature in which it will contrast rather boldly with its famous predecessor. In the latter, traffic in exhibited goods was strictly prohibited. At Sydenham the contrary is to be the case. Visitors will there be at liberty to purchase as well as to admire,—to carry away with them to their homes the choice productions of artistic and manufacturing skill. On this account we may reasonably expect a general interest to be taken in the new Exhibition, by the trading and speculating classes of the country. Within the great commercial wheel of the company itself, a thousand lesser ones will be set revolving; creating, upon the whole, a very busy scene indeed. The patentees of new inventions will, we understand, enter very numerously and prominently into the general competition. This one class alone will be likely to produce a very charming entertainment for visitors of an ingenious turn of mind; while the publicity afforded by the possession of a stall in the Palace will, in many cases, serve the very valuable purpose of bringing into notice a useful invention, which, without such a display, might remain in comparative obscurity, and prove to its meritorious author a source of expense instead of emolument.

We have thus briefly sketched what appear to us to be the main features of the great exhibition soon to be made public. At a future time, when the arrangements of the department of machinery are more advanced, we shall be careful to bring them before our readers. It now remains for us to say, that the nature and extent of the influences exerted by those branches of the undertaking more particularly devoted to the extension of knowledge throughout the community, will, in our judgment, depend very materially upon the quality of the guide-books that are prepared for the several departments. Let us take, for example, the historical illustrations furnished in the revived monuments of past epochs. He who travels from his own land and witnesses the veritable ruins of antiquity, derives a double benefit from what he sees, viz., an increase of knowledge and an elevation of feeling. It is impossible for a man of a susceptible nature to roam among the sacred records of departed cities and dynasties without receiving impressions which are calculated to ennoble the mind and to impart dignity to the character. But the remains of the past congregated at Sydenham, being removed from their natural environments, will produce such impressions but very imperfectly. It cannot, for instance, be expected that men will gaze with the same emotions upon the mighty image that will sit in the transept, looking down upon the gay crystal fountain, as if they saw the colossal god, where for ages he has sat enthroned at the awful portals of his desolated temple. Nor can it be possible that the mind will be equally affected by the sight of the sphinx, whose "calm eternal eyes" are fixed, say upon a flower-pot, as by beholding it gazing, as it has gazed for centuries, over the solemn memorials of departed empires. Beside, it must be plain to all that the circumstances of the visitor in the Palace will but seldom be favourable to those salutary reflections which the monuments of the past often awaken under less disturbing conditions. So that the great utility of visual teaching must almost entirely consist in the communication of facts; and it is very clear that the majority of persons, especially those of the less educated classes, will require considerable aids in order that they may look with any advantage upon the objects intended to administer pictorial lessons to them. In fact, the simple unaided effect of the latter upon the minds of such persons would be rather vague than profitable, and tend to impress them with the belief that the ancients, at least, must have been unduly enamoured with either folly or mystery. These reflections force upon us the conviction, that to make the Exhibition really serviceable to the many, they must be furnished with ample information concerning the works exhibited, and that, too, in an entertaining form. In short, the Palace is an illustrated volume, and those who inspect its pages will need letter-press explanations. We foresee the inconvenient dimensions to which such descriptions would tend to grow, but still we cannot help believing, that without them but little real information will ever be conveyed to the

great industrial masses, notwithstanding all the Company's outlay. We should be pleased indeed to find the necessity we have here indicated lead to the publication of a cheap and well-written "Crystal Palace Library."

By some persons the Company have been charged with precipitancy in appointing so early a day as that nominated for the opening of the Palace. It has been urged that many of the departments must necessarily be far from completion for many weeks to come, and that injury to the undertaking is likely to ensue from the admission of the public to the Exhibition in its unfinished state. We do not concur in these opinions. If the Palace were to be but a temporary spectacle, we might consent to plead for the most effective inauguration that delay could render attainable. But regarding it as a great institution for the permanent instruction of the public, and one which is to be sustained by the sympathies of intelligent men, we do not apprehend that any evil will result from throwing open its doors at the very earliest possible day consistent with the unimpeded progress of the works. We are perfectly certain that the surprising results already attained by the unwearied energies of the Company's officers cannot fail to command admiration of their past and sympathy with their future efforts.

Like many others who have addressed the public upon this subject, we have spoken of the Crystal Palace at Sydenham as the "Palace of the People." Whatever others may have intended by the term, we have employed it in no restricted sense. We think we are justified in looking upon this building as an essentially national structure, to which all classes may repair with equal freedom. Undoubtedly it will open up sources of delight and instruction, in which princes and artizans, peers and peasants, may wisely and willingly participate. And yet there are weighty matters connected with it in which the masses are mainly interested. One of these is the vexed question of the Sunday opening. We do not say that the masses only have a right to discuss this, but it is apparent that they are far more directly concerned in it than those to whom the Palace is accessible on any of the six days, during which the former are chained down to their toilsome callings. And to us it appears perfectly anomalous that the labouring millions of England should have in this age to plead for permission to enjoy innocent and healthy entertainment on the only day of the week on which their labour is suspended. We are not fond of uttering bitter things, nor are we usually admirers of popular agitations, but we certainly hope and expect to see the industrial classes aroused into irresistible determination to see abolished a law which prohibits a workman from gratifying a laudable desire of spending his Sunday afternoon in the Sydenham Palace or grounds, and which practically compels him to seek in public gardens or gin-palaces that recreation which God has ordained to be an antidote to toil. And we would recommend those who are seeking to retain the existing prohibition, to remember that under a pretence of piety they are virtually perpetuating a state of society in which it may be said of the multitudes, that when the lash of labour is off their backs the cordials of vice are at their lips. We hope soon to hear the people pronounce decisively and finally on this matter. Let them remember that Acts of Parliament were made for men, not men for Acts of Parliament, and demand an adaptation of the laws on Sabbath observation to the spirit and culture of the times.

Some, indeed, have manifested indifference to this subject on the ground that the people of London *only* are concerned in it. This we think we could, space permitting, readily prove to be a fallacy. But supposing it true, we are at a loss to discover why this should be a cause of unconcern to a nation which professes to feel an interest in the social condition even of foreign provinces of which the entire populations are numerically less than that of the metropolis. Much sympathy has, for example, been displayed during the past year, among certain classes, for the injured subjects of the Grand Duke of Tuscany. But the Grand Duchy of Tuscany falls short of London in its population by hundreds of thousands; and the entire Greek people amounts to considerably less than one-half of those who dwell in our capital! It is preposterous, therefore, for persons who demand freedom in Tuscany and Greece, to treat the movement under consideration as a matter of small and local interest.

There is one other concession which we think the public have a right to expect; but this must come from the Crystal Palace Company. It is well known that the practice of closing manufactories and houses of business early on Saturday is happily becoming very general in this country. We had hoped that the existence of the new Palace would have given a helpful stability to this habit. Unfortunately, however, we find, from the published statements of the Company, that on Saturday the price of admission will be five times as great as on the early days of the week, and thus the working classes will be subjected to a second exclusion, which will also act injuriously on the practice we have alluded to.

ON A NEW SMOKE-CONSUMING AND FUEL-SAVING FIREPLACE,

WITH ACCESSARIES ENSURING THE HEALTHFUL WARMING AND VENTILATION OF HOUSES.

Being a Paper read before the Royal Society of Arts, May 10, 1854,

BY NEIL ARNOTT, M.D., F.R.S.

(*Concluded from page 468.*)

There are yet subordinate advantages of the new arrangement of fireplace, among which the following may be noted:

1. Chimney-sweeping can scarcely be wanted where there is no soot.

2. Chimney-flues without soot cannot catch fire, and, if fire were in any way there introduced, by shutting the hood-valve it would be certainly extinguished. Thus a large proportion of the conflagrations of buildings may be avoided.

3. The huge evil (almost universal) of smoky chimneys cannot occur with this grate.

4. The occasional sudden rush of air towards a hot wide chimney, when the door is opened, and which carries readily the light muslin dress of a lady towards the grate and inflames it, cannot happen with this grate.

5. The danger of sparks from exploding pieces of coal thrown on the carpet does not exist here; for all the coal is first heated and coked while deep in the coal-box, and covered over. Thus a fire-guard is not wanted on this account.

6. The strong draught of a voracious fire in one room, or in the kitchen of a house, cannot disturb and overcome the action of other chimneys in the house, as is now very common.

7. The strong draught of any well-constructed fireplace may, by a connecting tube, be made to ventilate any distant rooms, staircases, cellars, closets, &c.

8. The strong and copious draught caused by momentarily opening the hood-valve or damper, will prevent the diffusion of dust when the fire is stirred or disturbed.

9. The chimney-valve, by its powerful ventilating effect, obviates all objections to the use of gas-lights in houses, thus leaving the beauty, cleanliness, cheapness, and many conveniences of gas unmarred. Explosion from accidental escape of gas in a room or house, of which occurrence there have been some destructive instances, cannot happen where there is the ventilating chimney-valve; for cold coal-gas entering a chimney-flue, produces a more powerful draught than hot air does.

10. The improved chimney draught in attic or upper rooms will make these more valuable, and will increase the comfort of low houses and cottages.

11. It would, moreover, be convenient occasionally to carry the flue of a close-stove or bath, or the ventilating tube from lamps in staircases, into any acting chimney.

12. This torch-fire (as some have called it, because it burns from above downwards, like a torch or candle) is remarkably adapted also for the purposes of the kitchen.

13. The change of any existing grate of an old fashion into this is easy and inexpensive, and, by having a piston-plate with holes, it can be used as a common grate.

14. Any kind of coal or coke may be used in this grate, even the small culm or coal-dust, which is very cheap. In a common grate, coke or Welsh stone-coal would be objectionable, because containing chiefly heavy carbonic acid instead of the steam and carburetted hydrogen of bituminous coal, and the gas, which is poisonous, might spread in the room; but, by the strong draught of the hood, this could not happen.

I might extend this list, but I need not.

Before concluding, I may direct attention to the remarkable fact, only of late well understood, that of the only four great necessaries of life, or things which Providence has left to man in various parts of the earth to procure for himself, namely, fit air, temperature, aliment, and work alternating with rest,—the skilful management of a domestic fire goes far to secure the two first named, namely, fit air and warmth; but these are the last which men come to understand well, because they are invisible and impalpable, and therefore to be perceived only by the eye of the mind after much cultivation.

After the reading of the paper, the Chairman, Dr. L. Playfair, said that as the Society had recently spent two evenings upon the discussion of furnaces for steam engines and manufactories, the subject for their consideration this evening should be confined to fireplaces for domestic purposes. It was in respect of the almost total freedom from smoke that the common household fire of Dr. Arnott would be considered popularly interesting. Now smoke, like other dirt, had been defined as merely matter in a wrong place. The true place for the products of combustion was to perform a great function as transparent gases in the atmosphere. The habits of civilization increased population rapidly, and an augmented vegetation was required for their support. Now by the very habits of civilization, the ancient vegetation of former times, now in the form of coal, was exhumed, and, after being used in our fireplaces, was again thrown into the atmosphere to promote vegetable growth, required by that population which thus artificially compensated for its own increase. The Chairman stated that he had often thought that

we were coming to a time when gas would be to a great extent used for domestic fireplaces, and the coke thus formed in large quantities, and offered at a cheaper rate, would be employed for manufacturing purposes, thus producing smokeless fires in both cases. Now Dr. Arnott's fireplace effected this combined object by one operation. The part of the grate under the bars into which the coal was placed, became, in fact, a gas retort, which gave out a gas that burnt mainly at the top, whilst the coal underneath being now coked, was raised into the fireplace, and also burned without smoke, but with great brightness. The arrangement by which he prevented a large unnecessary draught of air passing up the chimney, whilst it economized fuel, improved the sanitary condition of our rooms, by preventing the dangerous currents of cold air. Besides all these scientific advantages, the fire itself was of a genial home character, and did not run counter to our present prejudices. A witty archbishop had been stated to have defined ladies as creatures who could not reason, and who poked the fire from the top. However untrue the first part of the definition might be, the last certainly coincided with fact, and any fireplace which prevented obstacles to the gratification of this propensity, would have little chance of succeeding with the superior authorities at our homes. But Dr. Arnott's fireplace, in appearance, could scarcely be distinguished from those in common use, while it possessed advantages much superior to them.

Lord Ebrington being called upon, pleaded his unpreparedness to speak before so many scientific men, but felt bound to pay a tribute to Dr. Arnott's generosity and public spirit in presenting this, as he had all his previous valuable inventions, gratuitously to the public. His attention had been much called lately, at Paris, by one of the most eminent French military medical men, to the disease and mortality resulting from the defective ventilation of the barracks and hospitals there; a complaint, he feared, almost as applicable to our barracks and hospitals as to those of the Continent. There were various great advantages in the grate before them, but he was delighted to find Dr. Arnott speaking of it as an invention to the successful use of which the addition of a ventilator was indispensable, while the use of his ventilators without the contraction of the chimney's throat, exhibited in the hood of his grate, was always liable to prove, as it had too generally proved, a failure; with the new grate there would be no fear of the ventilators not acting. The absence of draught to his grate, valuable on all accounts, was doubly valuable in London, where, owing to the defective condition of our sewers, a powerful draught to the grate was liable to cause us to ventilate our sewers through our living rooms. Living, as he did, in a house the chimneys of which not only smoked themselves, but frequently, when no fire was lighted under them, sucked down the smoke from the chimneys with fires, and introduced it into the house through fireless rooms, he could well appreciate the comfort of an invention which put an end to the smoke of domestic fires altogether.

Mr. Eldridge said he had sent a drawing of a stove to the Society, which he called a rotatory wheel-stove, which was exactly on the same principle as Dr. Arnott's, that of distilling the gases through the incandescent portion of the fire. Supposing the fire to require feeding, green coal was placed in the top part of the grate, which was then turned half round, so that the green coal occupied the lower portion. He considered they ought to have a fire which could be put out immediately; this might readily be accomplished by the wheel-stove. He also recommended the use of brick backs, brick sides, and brick bottoms, to ensure durability, as well as to increase the amount of heat.

Dr. Hofmann stated that he considered Dr. Arnott's new grate as a happy combination of whatever was desirable in a fireplace. There was one point upon which he had been apprehensive, and this was the brightness of the fire; but in this respect, too, the new arrangement had proved eminently successful. If the supply was properly managed, the intensity of the light emanating from the seat of combustion was not only equal, but actually superior, to that of an ordinary fireplace. The reason was, the large mass of solid matter (coke), kept in a state of full incandescence in the flame of the gas generated at the line of contact between the ignited fuel and the fresh supply. The same principle had been lately applied in a very elegant contrivance of Professor Steinheil, in Munich, who had proved, by a series of very accurate photometric measurements, that the illuminating effects of a gas flame might be raised to double and even treble its ordinary amount, simply by appropriately introducing a solid substance (a wire of certain dimensions), into the lower portion of the gas-flame.

Mr. D. K. Clark found that the statements of Dr. Arnott with respect to the phenomena of domestic fires exactly tallied with his own experience of the working of the larger fires of furnaces. It was well understood that the best form of chimney for steam-boiler furnaces, was that in which the chimney was widened in its horizontal section towards the top; when the entrance to the chimney was sufficiently wide for the passage of the smoke, and the widening of the passage up-

wards facilitated the ascent of the smoke, and strengthened the draught. Similarly Dr. Arnott preserved undiminished the internal section of the domestic chimney, and left it wide and easy for the ascent of the smoke, while he very much contracted the throat or entrance of the chimney over the fireplace. There was also the collateral benefit of more perfect combustion, due to the acceleration and concentration of the draught claimed by Dr. Arnott, and confirmed by Dr. Hofmann, in his remarks on the peculiar brightness of the incandescent fuel to the superior draught. Mr. Clark had much pleasure in testifying to the advantage of a rapid, or rather intense draught, in perfecting the combustion and extinguishing the smoke. This was the panacea he constantly held forth for the universal prevention of smoke in large furnaces, as he had often witnessed the power of an intense draught in preventing smoke in locomotive boilers, when properly taken advantage of. He confessed he had not clearly seen how the specific could be made available in domestic fires, until hearing from Dr. Arnott the simple plan he had devised; and he added that when the same principle appeared to prevail in such extreme cases as domestic fires and locomotive furnaces, the pleasing probability was that the doctrine of intense draughts and perfect combustion, *versus* sluggish draughts and the production of smoke, was a sound one, and founded in nature.

Mr. E. Chadwick, C.B., in moving that thanks be given to Dr. Arnott for the communication of his simplification of a most important invention, and for his clear exposition of its principles, said that it was necessary that steps should be taken to make the relative magnitude of the subject duly understood. Its importance to health had been fully stated. But if with that the pecuniary economy at issue were duly impressed upon the public, there would be anti - smoke leagues, and subscriptions, and agitations in aid of such legislative measures as might be obtainable for their protection. To go at once to the case of the poorest classes. The fuel for the most wretched grate costs, at the least, a shilling per week. A manufacturer fully competent to give the assurance, Mr. Lee Stevens, had that night stated to them that the invention might be effectually applied to common grates at a rate of less than one pound each. Now, whilst half the poor man's fuel was saved, or a double warmth was given to him for the same expenditure of money, the outlay for the new appliance would be repaid from the saving of fuel alone in less than half a year, whilst his neighbours, as well as himself, would achieve a still greater saving in the expense of washing and the wear of clothes, that was provided, as to this branch of saving, that the application of the improvement was made general. The consumption of fuel in the metropolis was returned in 1841 as 2,566,899 tons. During the last thirteen years it was estimated to have increased to upwards of three millions and a half of tons. At 17s. per ton, the saving in fuel alone, by the general adoption and the prosecution of the means placed at their disposal, which they were assured were applicable to every description of range as well as grate, would be nearly a million and a half per annum. But the most important saving was, in saving the expense of washing. Any one who did duty amongst papers in a London office, and who went to live in a detached house in a rural district, by observation of the length of time during which linen kept clean in a detached position in the country, though it might have its share of the cottage smoke, as compared with the time during which linen was useable in any part of London, would be fully convinced that the entire abolition of the smoke nuisance from the domestic grate and range, as well as from the manufacturers' furnaces, would effect a reduction of more than one-half the expense of washing, as well as of the wear and tear of linen. He had some time ago occasion to inquire what those expenses were; he found that to the middle classes they made one-twelfth or one-thirteenth of their income, often about half the rated rental of their houses; but taking all classes, high and low, those expenses could not be averaged at less than one shilling per head per week on the population, or to the two millions and a half of the metropolis, the washing bill was not less than £5,000,000 for the year's washing. On some points of the estimated saving there might be deductions, but on others there would be additions to be made, and, extravagant as it might appear to those who had paid no attention to the subject, the pecuniary economy in washing as well as in fuel, obtainable by the total abolition of the smoke nuisance, was understated at three millions per annum to the metropolis alone. If Lord Palmerston was duly supported in the abolition of the nuisance to private households as well as in the abolition of the smoke nuisance, a saving would be effected of double the contribution which the Chancellor of the Exchequer was obliged to require from the metropolis by malt tax and other taxes in support of the war. Smoke nuisance from the furnaces was, in the aggregate, the lesser evil, and the sources of the lesser economy; but the economy of heat and power, as well as of smoke from the manufactories, was only at its commencement.

ON THE FATIGUE AND CONSEQUENT FRACTURE OF METALS.

At a recent meeting of the Institution of Civil Engineers a paper was read on the above subject by Mr. F. Braithwaite, M. Inst. C.E.

Many accidents, the causes of which had been pronounced "mysterious," having professionally engaged the author's attention, he had carefully examined the circumstances of each, and the condition of the fractured metal, in all cases, and at length arrived at the conclusion, that almost all the accidents might be ascribed to a progressive deteriorating action, which might be termed the "Fatigue" of metals.

Metal in a state of rest, although sustaining a heavy pressure or strain, as in a beam or girder, and exhibiting only the deflection due to the superposed weight, would continue to bear that pressure without fracture so long as its rest was not disturbed, and the same strain was not too frequently repeated; but if either of these cases occurred a certain disturbance of the particles took place, the metal was deteriorated, and that portion subject to the reiterated strain was so far destroyed, that it ultimately broke down. This might also arise from sudden concussions, when the metal was under a certain strain, and those concussions might be caused by the girder being suddenly unloaded.

Several examples were given of accidents of the kind that had been alluded to; for instance, that of a vat in a London brewery, carried on cast-iron girders, by which it had been supported for some years; but suddenly, without any apparent cause, they broke, and killed and wounded some workmen. In this case it was shown that the girders were not originally sufficiently strong for the load, and therefore the intermittent load of the vat, which was sometimes full and at other times only partially so, and then empty, caused a constantly recurring deflection, and a subsequent corresponding effort to regain its natural position, by which the composition of the metal was disturbed, and fracture ensued.

Other examples of the same nature were given, and it was shown that the repeated buckling of the tube-plate of a locomotive, arising from the action of the pistons, had a tendency to cause fracture mechanically; and also that the side-strains and vibrations to which the suspension-rods of the ash-pans of locomotives were subjected, had produced very serious results, which it sufficed to point out forcibly to guard against the recurrence of.

The author contended, that presuming adequate dimensions to have been given to girders, and the stipulated weight not to have been exceeded, the chances of accident were remote, but that any repeated deflection, either at intervals, or continued for so long as to induce a permanent depression, must be productive of danger, which could only be averted by altering or replacing the parts deficient in strength, and maintaining a rigid supervision, whether of beams when loaded, or of parts of machinery, or of railway stock after working. By such means accidents would be prevented, and a greater degree of confidence be established in structures, in which metal was employed.

The President's conversazione was announced to take place on Tuesday evening, May 30th, and models and works of art were requested for exhibition.

DOINGS IN OUR MATHEMATICAL PERIODICALS.

To the Editor of the Mechanics' Magazine.

Sir,—I beg to offer you the following for insertion in your pages. Its bearing upon some practices recently exposed in your Magazine will be obvious to every reader; and when I state that the same gentleman has had his paper read before the Royal Society—reviewed and advertised for sale in the *Educational Times*—and printed in the February Number of the *Cambridge and Dublin Mathematical Journal*—the castigation he now receives will not appear to be undeserved. I copy the letter from page 172 of the *Cambridge and Dublin Journal* for May, just published:

"To the Editors of the *Cambridge and Dublin Mathematical Journal.*

"Gentlemen,—I request the insertion of the following statement in the next Number of your Journal.

"Having read a paper by Mr. Matthew Collins, 'On Clairaut's Theorem,' which appeared in the February Number of the *Journal*, I think it right to state, that the substance of that communication has been taken, *without acknowledgment*, from a series of Lectures delivered by the late Professor MacCullagh, in the University of Dublin, in Hilary and Michaelmas Terms, 1846.

"I attended the lectures alluded to, in company with Mr. Collins amongst others; and a memoir containing an account of them has been prepared by me for the Royal Irish Academy, and was published some months since in its *Transactions*.

"In the course of last year Mr. Collins published a pamphlet absolutely identical with the paper which appeared in the *Journal*. He sent several copies of this pamphlet to distinguished members of the University of Dublin. I have now before me one of these

copies, on the title-page of which Mr. Collins has *written* the following acknowledgment:—'Extracted from manuscript notes taken at MacCullagh's Lectures.'

"I have the honour to be, Gentlemen, your obedient servant,

"GEORGE J. ALLMAN, LL.D.,
"Professor of Mathematics, Queen's College, Galway."

April 10, 1854.

On referring to the *Lady's and Gentleman's Diary* for 1854, page 70, I find that the Editor of that periodical was presented with a copy of Mr. Collins's "able pamphlet on Clairaut's Theorem," which he very justly pronounces to be "remarkable, both as regards conciseness and originality." It was not *then* known how much use had been made of the *dead lion's skin*. The Editor of the *Educational Times* also expresses himself much pleased with the essay, and has taken the trouble to institute a comparison between the methods in the pamphlet and those adopted by the Astronomer Royal, when treating the same subject in his *Mathematical Tracts*. Dr. Allman's *exposè*, however, will have the effect of restoring the honour "to whom it is due," and his victim will add another to the list of jackdaws which are thus being ruthlessly despoiled of their peacock's feathers.

I am, Sir, yours, &c.,

May 19, 1854. ARGUS.

PROPULSION BY JETS OF WATER.

To the Editor of the Mechanics' Magazine.

SIR,—I have read with much interest the correspondence and reports on the subject of propelling vessels by means of jets of water, which have lately appeared in your Magazine, and cannot help being of opinion that there is a great deal of vagueness and inaccuracy in what is thought and said on the question; I therefore send you an idea or two respecting it, which I have not seen introduced previously, though they *may* not be of a novel kind, thinking them to be conducive to a clearer view of the matter. A propeller, like the one in debate, I consider to be identical in principle with Hiero's rotative engine, for in both machines the motive power consists of the reactive force of a jet of fluid driven forth with considerable velocity; the difference between the two being that in one case the operating fluid is generated at and under a pressure, and in the other its velocity of issue arises from mechanical force applied to it; neither of which conditions appear to me to be of importance as regards the principle of the machine, nor likewise the fact of the operating fluids being of different densities in the two cases. Such conditions as the weight of the fluids employed, the manner of generating them, giving them velocity if they are taken ready made and are comparatively incompressible, as in the present instance, compressing, heating, or dilating them, or in any other way causing them to work by the force of a jet, appears to me to be immaterial to the principle which I hold respecting all such machines being simply specimens of the Hiero engine, *in principle*, however different they may be in form. In my considerations of the subject, I take that idea as my starting point and principle; and I set to work to examine a new (if the present apparatus is new) form of application of the principle of the above mentioned ancient jet engine, and have found the subject very much simplified and cleared by keeping my starting idea well before me and adhering to it. I do not send you my conclusions at length, but merely say that they are decidedly more in coincidence with those of Mr. Baddeley than of "D. K. C." That Hiero's engine is a fixed, rotative one, does not appear to me to alter the case; it cannot give off more than its working pressure, minus friction, be it stationary or travelling, and that is all that we require the jet propeller engine to apply to the fluid which it drives through the jet, which leaves that point one of detail, not of principle.

If, then, the principle of Hiero's engine is, as is generally supposed, a very bad one as a power developer, though it may be otherwise useful, it will follow that if the propeller in question is on that principle, it is by no means likely to make the most of the motive force.

I am, Sir, yours, &c.,

AN OBSERVER.

To the Editor of the Mechanics' Magazine.

SIR,—I should have permitted the remarks of "D. K. C." (page 470) in your last Number to pass unnoticed, but that the permission given me to "construct definitions" is a direct insinuation that the extraordinary definitions enunciated by "D. K. C.," and commented upon in my last (page 444), were mine! "D. K. C." may be naturally anxious to disown the paternity, and I am equally indisposed to father such monstrosities.

That the friction of water in passing through pipes (either large or small) increases with the velocity, is no new discovery; and "D. K. C." may continue "to hold that opinion," in common with myself and many others.

That a jet of water, used as a propeller, is more advantageous when issuing from a large aperture at a moderate velocity than a jet from a smaller orifice at a higher

velocity, may be the opinion of "D. K. C.;" but this view of the matter is by no means clearly established; indeed, the results of many of the experiments that have been made favour an opposite conclusion, but I will not offend "D. K. C." by "quoting the authorities." The best size and velocity of the jet, the most economical mode of obtaining a jet, and the efficiency of the best jet as a propelling agent for vessels, are all of them questions upon which the late discussions at the Institution of Civil Engineers showed scientific men to be by no means agreed. Until some more decisive results are obtained, propulsion by the jet is a matter upon which each may be permitted to "hold an opinion," and I hope, without offence, agree to differ.

Although always prepared to hold my own opinion, I feel more comfortable when it is in accordance with, than in opposition to, that of better authorities.

I am Sir, yours, &c.,
Wm. Baddeley.

13, Angell-terrace, Islington, May 23, 1854.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Nasmyth, George, of Brabant-court, Philpot-lane, London. *Improvements in the construction of steam boiler and other furnaces.* Patent dated November 4, 1853. (No. 2559.)

In this invention the heat that ordinarily passes away into the brickwork at the sides of the furnace is used for heating the air before it comes in contact with the gases and flame in the furnace or flues, by making the sides of the furnace hollow, and by the formation of a passage in the bridge, which is to be constructed of two separate walls with a space between them. The inventor makes the hot-air chambers or passages at the sides of the furnace communicate at one end with the open air in the front of the furnace, and at the other end with the passage between the walls of the bridge.

Ginty, William Gilbert, of Manchester, Lancaster, civil engineer. *Improvements in the mode of manufacturing the combustible gases resulting from the decomposition of water or steam, and in the construction of apparatus connected therewith.* Patent dated November 4, 1853. (No. 2561.)

This invention is carried out by exposing carbonaceous or other materials, such as coal, coke, wood, peat, charcoal, and other materials, or a combination of any two or more of them, to high temperatures in close vessels or rotorts, made of iron or fire-clay, and passing steam or water over, into, or through the same in such manner as greatly to avoid the formation of carbonic acid gas.

Crosland, William, of Hulme, Lancaster, engineer. *Improvements in apparatus for governing the speed of steam and other motive-power engines.* Patent dated November 4, 1853. (No. 2562.)

This invention consists in a method of governing the speed of motive-power engines by an arrangement constituting a differential motion, the principle of its action depending upon the slackening or taking up of a chain, which passes over two surfaces, the one actuated by the motive power, and the other allowed to revolve by the vibrations of a pendulum.

Racster, William, of the Royal Military Academy, Woolwich, Kent, mathematical master. *Improvements in the construction and arrangement of the buffing apparatus of railway carriages, and in the mode of applying the buffer and drawsprings to such carriages.* Patent dated November 4, 1853. (No. 2563.)

In this invention the buffer-rods are arranged in pairs, and extend back considerably beyond the centre of the carriage, the ends of one pair of rods being made to slide in slots or sockets, formed in or attached to the pair at the other end of the carriage, and vulcanized India-rubber or coiled metallic springs are adapted to the ends of one of the pair, in order to neutralize the effects of sudden concussion.

Newton, William Edward, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for crushing ores, and separating therefrom gold, silver, or other metals contained therein.* (A communication.) Patent dated November 4, 1853. (No. 2564.)

The principal feature of this invention is the crushing machine, composed of a series of troughs containing a set of rollers or cylindrical surfaces, to which an oscillating or vibrating motion is communicated from the reciprocating-rod of the engine.

Pratt, Henry, of Boughton-street, Worcester. *Improvements in kneading dough, and which said improvements are also applicable to the kneading or treating of clay, loam, or other plastic materials.* Patent dated November 4, 1853. (No. 2566.)

This invention consists in arranging a convenient number of beaters, side by side, upon a stout bed of hard wood, stone, or other suitable material, inclosed at the two sides. The beaters may be formed of hard wood, working on an axis passing through them near the back ends, and set in the sides so as to allow a sufficient space between the bed and beaters for the dough or other material to be kneaded.

Foster, William, of Lister-place,

Bradford, York, manufacturer. *Improvements in looms for weaving.* Patent dated November 4, 1853. (No. 2567.)

This invention consists in a mode of raising and lowering the shuttle-boxes in looms, when checked, striped, or fancy goods are to be produced, and consists in attaching a number of tappets or segments to a wheel at the end of the loom; or a plate-wheel may be cut out in the form of tappets, these being intended to act upon a lever, which gives motion to the shuttle-box by a connecting-rod attached to the bottom of it, without any intermediate mechanism.

SMITH, JOHN, machine-maker, of the Albion Works, Bradford, Yorkshire. *Improvements in millstones for grinding corn, seeds, or minerals.* Patent dated November 5, 1853. (No. 2569.)

Claim.—"The mode of forming millstones with openings or apertures through the thickness of the running stone, and also with channels of more than one-half inch deep for the passage of air to cool the same."

NICKLIN, JOHN BANKS, of Bartholomew-lane, London, merchant. *Improved gelatinous or glutinous compounds for lubricating railway and other machinery.* Patent dated November 5, 1853. (No. 2570.)

The inventor takes any animal substance, and adding resinous matter to it, if necessary, reduces it, by steaming or boiling, to a gelatinous liquid, and then mixes it with palm or other vegetable oil, soda, whiting, and verdigris.

HARRISON, SAMUEL, of Crewe, Chester, engineer. *Improvements in and applicable to steam engines.* Patent dated November 5, 1853. (No. 2571.)

This invention consists in the application to the steam pipes of coupled engines, of a shut-off valve, by which, in case of accident, the supply of steam may be shut off from one engine and admitted to the other.

HYDE, JOHN, of Sheffield, York. *Improvements in furniture castors.* Patent dated November 5, 1853. (No. 2572.)

This invention consists in constructing ball castors, by supporting the frame upon one or more ordinary castors which bear upon the ball, in order to reduce the friction upon it, and to enable the ball to move or roll with perfect freedom in every direction.

CARR, CHARLES, of Seghill, Northumberland, mining engineer, and WILLIAM KYLE HORSLEY, of the same place, engineer. *Improvements in steam machinery and pumps for lifting water from mines and other places.* Patent dated November 5, 1853. (No. 2573.)

This invention consists in working two or more sets of pumps by means of one rod or spear.

JEARRAD, ROBERT WILLIAM, of Upper Eccleston-place, Eccleston-square. *Improvements in steam boiler and other furnaces.* Patent dated November 5, 1853. (No. 2574.)

The objects of these improvements is to prevent the emission of smoke from furnaces. For this purpose the interior of the furnace is made of such a height above the fire-bars as to admit of the introduction of a horizontal partition of fire brick, tile, or other materials, which proceeds from side to side, and from the front nearly to the back of the furnace. This partition is perforated with numerous holes, through which part of the products from the fire pass, whilst others pass through the space at the open end; above there is a second perforated partition of fire-brick or tile, fixed at the back, and proceeding nearly to the front of the furnace; the products from the fire pass under and then over this partition, and then away to the flue, which passes through the boiler at a lower level than that at which the heat and products leave the fire-box.

RUBERY, JOHN, of Birmingham, Warwick. *Improvements in the manufacture of open caps for sticks of umbrellas and parasols.* Patent dated November 5, 1853. (No. 2575.)

Claim.—Manufacturing the open caps for the sticks of umbrellas and parasols of zinc.

BARLOW, JAMES, of Bolton-le-Moors, Lancashire, manufacturer, and THOMAS SETTLE, of the same place, manager. *Certain improvements in power looms for weaving.* Patent dated November 5, 1853. (No. 2576.)

This invention consists in effecting the lathe motion for beating up the cloth as it is woven, by the substitution of a peculiar tappet-wheel or cam-wheel for the cranks usually employed for this purpose.

JOHNSON, WILLIAM BECKETT, of Manchester, Lancaster, manager for Messrs. Ormerod and Son, engineers and iron-founders. *Improvements in steam engines, and in apparatus for indicating the pressure of steam.* Patent dated November 5, 1853. (No. 2577.)

Claims.—1. In direct action vertical engines,—attaching the cylinder to an outside flange of the main framing, such framing having its strengthening part continued horizontally in the direction of the main crank-shaft. 2. In portable engines,—passing the governor, spindle, or shaft, through the boiler. 3. Giving motion to a crank, by means of a pin fixed to the eccentric rod, and working a governor or force pump from such crank. 4. In steam pressure indicators,—causing a piston working within a cylinder to act upon a valve, so as to form

a communication with any suitable signal whistle. 5. Connecting the short end of a bell crank lever with the piston of a steam pressure indicator, the longer end of the lever being used to indicate by a suitable scale the pressure of the steam.

KESTERTON, EDWARD, of Long-acre, Middlesex, carriage builder. *Improvements in springs for carriages.* Application dated November 5, 1853. (No. 2578.)

This invention, when applied to two-wheeled carriages, consists in carrying the shafts back to about one-half or two-thirds, more or less, of the length of the body of the carriage, and in joining thereto a spring or length of wood, carried to or beyond the end of the body; and in the case of elliptical springs it consists in making a joint at or about the centre of the ellipse.

PERSHOUSE, HENRY, and TIMOTHY MORRIS, both of Warwick, manufacturers. *An improvement or improvements in the deposition of metals and metallic alloys.* Patent dated November 7, 1853. (No. 2579.)

This invention consists in placing a cell of porous earthenware or other porous vessel in the solution employed, and in putting into this porous vessel a plate of the metal or alloy to be deposited, or a plate of zinc or other metal, and a solution or liquid capable of dissolving it under the influence of an electric current.

FALCONI, MARINO LOUIS JOSEPH CHRISTOPHE VINCENT, of Paris, France, gentleman. *A certain composition for the preservation of the dead.* Patent dated November 7, 1853. (No. 2581.)

This invention consists in forming coffins of a powder composed—1. Of saw-dust, by preference the dust of common deal, previously well dried and sifted fine; (or the dust may be of other vegetable matters not readily susceptible of decomposition). 2. Of a metallic salt, such as sulphate of zinc or iron. 3. Of pulverized camphor mixed with any other perfumed substance.

GRINDROD, JONATHAN, of Liverpool, Lancaster, consulting engineer, and ALEXANDER HUNTER, of the same place, engineer. *Improvements in steam engines.* Patent dated November 7, 1853. (No. 2583.)

In this invention a steam cylinder, or cylinders, is mounted so as to travel with a backwards and forwards motion at right angles to the main or driving shaft, advancing and receding with the crank. The piston-rod is immediately attached to the crank of the driving-shaft, by means of the crank-pin, so that the power of the engine is applied directly to the crank through the piston-rod, without the intervention of the connecting-rod generally used.

WIGLESWORTH, HENRY, of Newbury, Berks, bachelor of medicine. *Improvements in connecting together or coupling railway carriages.* Patent dated November 7, 1853. (No. 2584.)

Each one of a pair of these connections passes from the side of one carriage to the point of its attachment at the opposite side of the adjoining and connected carriage, so that the two cross each other; and each pair is so connected to a central draught-rod, that the pull upon this will at all times tend to tighten the cross connections.

ROUGHTON, ROBERT, of Woolwich, Kent, engineer in the Royal Navy. *An improvement in steam-boilers, which is applicable to other vessels for containing compressed air, vapour, or gas.* Patent dated November 7, 1853. (No. 2585.)

A full description of this invention was given in Vol. LIX., page 431.

WALKER, THOMAS, of Birmingham, Warwick, engineer. *Improvements in signal apparatus for the prevention of accidents on railways.* Patent dated November 7, 1853. (No. 2586.)

In this invention apparatus is so arranged that whilst one or more of the wheels of a passing train, or a projection from the side of one of the carriages, causes the signal apparatus to indicate danger, it also acts upon a clock-work or roast-jack movement, so as first to wind it up and then to release it when the train has passed; this movement is to be in connection with a signal apparatus, which, as the former unwinds, is made, after certain intervals, to indicate "caution," and "safe," to a subsequent train.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *Certain improved means for preventing fraudulent abstraction of property.* (A communication.) Patent dated November 7, 1853. (No. 2587.)

The primary part of this invention relates to the locks of safes, &c., and consists in making the key with the pod or bitt (that is, the part which acts upon the tumblers,) separate from and attachable to the body, which acts upon the other parts of the lock, for throwing the bolt or bolts, so that after the key has been inserted in the key-hole, the pod or bitt may be separated and removed from the body which remains in the key-hole, so that both may perform their appropriate functions independently in different parts of the lock, and be re-united afterwards.

GRAHAM, EDMUND HUGH, of Maine, United States. *New and useful improvements in fire-arms.* Patent dated November 8, 1853. (No. 2590.)

This invention mainly consists in the arrangement of a series of ball-chambers, and

a series of powder-chambers in concentric circles on the side of the gun-barrel, and out of the sight-range, so as to revolve and work against a common plate affixed to the side of the gun, in conjunction with a rotary charge-receiver, placed within the barrel.

CHAMBERLAIN, HUMPHREY, of Kempsey, near Worcester. *Improvements in the manufacture of bricks and tubes, or tiles.* Patent dated November 8, 1853. (No. 2591.)

Claims.—1. A certain described combination of brick-making machinery. 2. The manufacture of tubes, tiles, or bricks, by means of grooved rollers applied to expressing machinery.

PARRATT, GEORGE FREDERICK, of Victoria-street, Pimlico. *Improvements in life-rafts.* Patent dated November 8, 1853. (No. 2592.)

This invention consists of a combination of an air-tight flexible vessel, made by preference of vulcanized India-rubber, with spars and netting, or other open work or fabric, the flexible vessels being strengthened with canvas and netting.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in machinery for combing and preparing wool and other fibrous materials.* (A communication.) Patent dated November 8, 1853. (No. 2594.)

Claims.—1. A mode of working the combs by eccentrics or cams, which communicate a rectangular motion thereto. 2. The use of similar mechanism to that employed for working the combs for actuating the feeders. 3. The combination of combs and feeders, actuated as above described, with a horizontal moveable comb, either circular or composed of a series of combs. 4. The use of curvilinear eccentrics for actuating the combs and feeders. 5. Certain modes of cleaning the combs. 6. A mode of inclining the fibres before drawing, by means of a fan, or endless cloth, fitted with pallets.

SHEPHERD, GEORGE, of King William-street, London, civil engineer. *Certain improvements in the construction of railways.* Patent dated November 8, 1853. (No. 2595.)

This invention consists in employing in the construction of railways hollow sleepers or bearers, of wrought or cast-iron, or of a combination of wrought and cast-iron.

DUNN, THOMAS, of the Windsor-bridge Iron-works, Pendleton, Lancaster, engineer; JAMES BOWMAN, of Plaistow, Essex, engineer; and JOSEPH DUNN, of Bellevue-terrace, Pendleton, millwright. *Improvements in machinery for raising, moving, and lowering heavy bodies.* Patent dated November 9, 1853. (No. 2597.)

Claims.—1. Communicating motion to the various parts of a travelling crane, by means of a friction-roller, and parts acting in combination therewith. 2. The application of screws for imparting the requisite motions to travelling-cranes, as described. 3. The application of endless chains for transmitting the requisite motions to travelling-cranes, as described. 4. Working two or more cranes by steam, or other power, and communicating motion to them by a horizontal shaft, as described.

DRIEU, JEROME ANDRÉ, of Patricroft, Lancaster, machinist. *Improvements in machinery for cutting velveteens, and certain other fabrics, to produce a piled surface.* Patent dated November 9, 1853. (No. 2598.)

This invention consists in cutting the races or loops of velveteens, cords, and other such fabrics, by means of a cutter acting on the said races or loops, which, as the fabric proceeds through the machine, are drawn on to flat-pointed pieces of metal or other material over which the cutter is situated.

ATKINS, JAMES, of Birmingham, Warwick, writing clerk. *An improvement or improvements in ash-pits for grates.* Patent dated November 10, 1853. (No. 2601.)

Claim.—The application to ash-pits of a moveable vessel or lining for the purpose of receiving the ashes.

RODGER, WILLIAM, Lieutenant Royal Navy, of Shawfield-street, King's-road, Chelsea. *Improvements in anchors.* Patent dated November 10, 1853. (No. 2603.)

This invention relates to the "palms" and the "stock," and the object of it is to obtain a greater amount of holding power with a given weight of iron without diminution of strength. This is effected by a modification of the principle of a former invention of the patentee, dated May 18, 1846.

FOLSOM, SAMUEL MEAD, of Massachusetts, United States. *A new or improved instrument for ironing clothes or various other articles.* (A communication.) Patent dated November 11, 1853. (No. 2605.)

This invention consists of a metallic box or case, provided with two smoothing surfaces or flats, and so combined with a handle, by means of suitable journals and bearings as to enable either smoothing face to be turned downwards at pleasure. The case is made with openings in its two opposite vertical sides, which are provided with wire, gauze, or netting, which serve to let in air for the combustion of the alcohol of the wick of a lamp employed for heating the iron.

STURM, SOLOMON, of Carpenter's-buildings, London, optician. *Machinery for the manufacture of optical lenses.* Patent dated November 11, 1853. (No. 2608.)

Claims.—1. The construction of machinery for the manufacture of optical lenses, with a roller and cup arranged so as to combine a rotary with a longitudinal motion. 2. Constructing the roller or cup with detached plates, furnished with frames and covers for facilitating the operation of cementing to them the pieces of glass, or other substance, to be manufactured into lenses.

MONTFERRIER, ALEXANDRE ANDRE VICTOR SARRAZIN DE, of Paris, France, gentleman. *A new rotatory steam engine.* Patent dated November 11,1853. (No.2609.)

This engine consists of a triangular piston having its angles rounded off, inclosed in a sheet-iron cylinder, in which it revolves. Two curved paddles are fitted at opposite sides of the cylinder, and have an oscillatory motion on their axes. The steam acting on one of these at a time, and on the side of the piston, produces the motion.

BANNER, EDWARD GREGSON, of Cranham-hall, Essex, gentleman. *Improvements in saddlery and harness.* Patent dated November 11, 1853. (No. 2610.)

This invention is mainly intended to provide for the comfort of animals drawing vehicles, by making the collar on which the traces are attached by hames elastic, forming that part of it where the hames are fitted in the usual manner, but the part that rests upon the shoulders or withers of the animal of India rubber, water-proof canvass, or any other elastic or semi-elastic material, and inflating it with air.

WILLIS, JAMES, of Willingford, Berks, harness maker. *Improvements in buckles.* Patent dated November 11, 1853. (No. 2612.)

This invention consists in making the tongue of a buckle in such manner that it will slide through the cross-bar, or that part to which the tongue is usually jointed or hinged; and also in bending the tongue at right angles to the direction of the strain at that part which receives the strain from the trace or other strap.

DRYBURGH, RICHARD, of Leith, Edinburgh, Scotland, cooper. *Improvements in the means of holding staves while being cut.* Patent dated November 11, 1853. (No. 2613.)

Claim.—The use of an instrument or holder with teeth or projections upon it, by means of which staves may be suitably held while being presented to the teeth of a circular saw.

STEEL, WILLIAM, of Glasgow, Lanark, North Britain, brewer. *Improvements in machinery or apparatus for mashing malt.* Patent dated November 11, 1853. (No. 2614.)

The main feature of this invention consists in passing the malt and water together through a cylindrical or conical-shaped mashing vessel of wood or metal, which is distinct and separate from the mash tun.

KILSHAW, HENRY, of Birch, near Middleton, Lancaster, manager, and RICHARD HACKING, of Bury, machinist. *Certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.* Patent dated November 11, 1853. (No. 2616.)

This invention relates to Smith's self-acting mule.

Claims.—1. The use of an inclined plane capable of graduation, and placed in connection with the click and ratchet-wheel applied to the "backing-off" motion in weft mules. 2. A peculiar arrangement of inclines, actuated by a ratchet-wheel and screw, or any other mechanical equivalents constituting a "backing-off" motion for twist mules, and the use of a catch-box and shifting-lever, worked by any suitable gearing for varying the twist. 3. A peculiar arrangement of a series of catch-boxes, throwing in and out of gear a large and small pulley, and worked by any suitable arrangement of machinery, so as to gain a double speed "twist motion."

*** The documents of Nos. 2582 and 2620 are with the Law Officers under first reference.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HINDMAN, WILLIAM, of Manchester, Lancaster. *Improvements in the construction of steam boilers, and in the mode or method of fixing the same.* Application dated November 4, 1853. (No. 2560.)

The inventor constructs the fire or furnace place of a peculiar shape, and fixes in the centre of it an air tube, which attracts the flame from both sides. By the current of air thus introduced, the flame then enters and passes first through one and then through another flue, in order to create a large amount of heating surface and secure the entire consumption of the smoke.

HIGGINBOTTOM, JOHN HARTLEY, clerk of works to the Local Board of Health, Ashby-de-la-Zouch, Leicester. *Improvements in water-closets, and in the apparatus connected therewith.* Application dated November 4, 1853. (No. 2565.)

This invention consists in the employment of a service-pipe, fitted with two cocks or valves, which are simultaneously acted upon by the seat as it descends.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the manufacture of malleable iron, which*

improvements are also applicable to the manufacture of other malleable metals. (A communication.) Application dated November 4, 1853. (No. 2568.)

This invention relates to the manufacture of malleable wrought iron, or other metal bars, to be afterwards used in the construction of axles, rails, tyres, &c., and consists in twisting a number of bars singly, and afterwards faggoting them together, so as to be welded or rolled in the ordinary manner.

TODD, JOHN, of Fish-street Hill, London, engineer. *Improvements in the spindles and bearings of lathes and drilling-machines, and in other spindles and bearings.* Application dated November 7, 1853. (No. 2580.)

This invention consists mainly—in forming the bearings and spindles of the mandril head of conical forms with the larger ends of the cones towards the nose of the mandril.

ONIONS, JOHN, and SAMUEL BROMHEAD, of Marlborough Estate, Peckham, engineers. *Certain improvements in machinery used in the manufacture of paper and papier-maché.* Application dated November 8, 1853. (No. 2588.)

These improvements consist—1. In making the plate of the machine in one piece of any size or shape, instead of making the knives separate, and bolting them together. 2. In making and bolting the knives in segments on the roll diagonally, thereby causing the knives of the roll and the bed-plate of knives to act similarly to scissors, shearing the material instead of chopping it, as is usual.

GARDINER, JOHN, of Great Marlow, Buckingham, ironmonger, and WILLIAM WATKIN WYNNE, of the same place, brewer. *An improved construction of gas-stove.* Application dated November 8, 1853. (No. 2589.)

This gas-stove is intended to give off heat, and also heat and retain at a high temperature a body of water, which may either be caused to circulate through pipes for the purpose of warming adjacent apartments or be otherwise employed. The case of the stove is made cylindrical by preference, with a pierced dome-shaped top, and near the upper part of it are shoulders to receive an inverted conical boiler, and hold it in position.

HAYWARD, EDWARD LAMBERT, of Blackfriars-road. *Improvements in the roses of door and other locks.* Application dated November 8, 1853. (No. 2593.)

In carrying out this invention, each rose is constructed of two parts, one of which is fixed to the door or surface where the knob comes by screws, such part being made to project round the opening where the spindle passes, and against and into this projection the knob passes.

DANGERFIELD, BENJAMIN, and BENJAMIN DANGERFIELD, junior, both of West Bromwich, Stafford, engineer. *Improvements in the construction of steam boilers.* Application dated November 9, 1853. (No. 2596.)

This invention consists in conducting the heated air and products of combustion through tubes, situated vertically at and near the axis of the boiler. These tubes rise nearly to the height of the water-line in the boiler, and then diverge in a horizontal or nearly horizontal direction to the exterior of it.

BROWN, JOHN, of Darlington, Durham, mining engineer. *Improvements in coke-ovens.* Application dated November 9, 1853. (No. 2599.)

This invention consists in dividing coke-ovens by a cross-pillar of brickwork, masonry, or other suitable material.

DICKS, WILLIAM, of Floore, Northampton, smith. *Improvements in wheels for carriages.* Application dated November 9, 1853. (No. 2600.)

This invention consists in forming the spikes of wheels of metal and of a hollow elliptic section; and in setting them so as to present their narrow edges to the atmosphere as they revolve, and thus offer less resistance than if placed as at present; the tires are also to be formed of iron, and made double.

PIDDING, WILLIAM, of Tachbrook-street, Pimlico, Middlesex, gentleman. *Improvements in the manufacture of fabrics made of silk, cotton, wool, flax, hemp, straw, grasses, fibres, mohair, and other hair, spun glass, and enamelled, glazed, or plain wire, and in the application of some of those materials, and also in the machinery or apparatus connected with such manufacture.* Application dated November 10, 1853. (No. 2602.)

This invention relates to a former patent of the inventor, dated March 9, 1853, and consists mainly in fixing the raised loop-pile, formed according to that patent, to any suitable material, by means of an adhesive substance.

STEVENS, JAMES, of Darlington Works, Southwark-bridge-road. *Improvements in the steps or bearings of the axles or shafts of gas-meters.* Application dated November 10, 1853. (No. 2604.)

This invention consists in forming the bearings of gas-meters of a non-metallic substance, such as stone, glass, ivory, bone, &c.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of South-street, Finsbury, London. *Improvements in preventing accidents on railways, also in shifting and lifting railway carriages.* (A communication.) Application dated November 10, 1853. (No. 2606.)

One feature of this invention consists in employing India-rubber tubes, through which verbal messages are to be communicated; and another consists in forming across the line a trench, in which are laid rails, upon which a car that receives the carriage to be shifted from one line of rail to another is intended to run.

Parker, William, of Birmingham, Warwick, wire-worker. *An improvement or improvements in bearings for machinery.* Application dated November 11, 1853. (No. 2607.)

This invention consists in forming the bearings or journals of machinery of glass, porcelain, or other vitreous or semi-vitreous substance.

Walker, Henry, of Gresham-street West, London, manufacturer. *Improvements in means of communication from one part of a railway train to another.* Application dated November 11, 1853. (No. 2611.)

This invention consists in employing tubing (of gutta percha by preference,) under the floor or framing of railway carriages.

Platt, John, of Oldham, Lancaster, machinist. *Certain improvements in apparatus or machines for forging, drawing, moulding, or forming spindles, rollers, bolts, and various other articles in metal.* Application dated November 11, 1853. (No. 2615.)

This invention relates to Ryder's forging machine, and consists mainly in an arrangement by which the springs (either internal or external) hitherto used for lifting the hammer after the blow has been struck, and for keeping the "cradle" in contact with the eccentric, are dispensed with, by connecting the hammer with the eccentric, so that it will lift it as well as force it down.

PROVISIONAL PROTECTIONS.

Dated April 7, 1854.

816. James Edwards Wilson, of Great George-street, Westminster, civil engineer. Improvements in the construction of iron girders.

Dated April 18, 1854.

891. Julian Bernard, of Club-chambers, Regent-street, Middlesex, gentleman. Improvements in stitching, and machinery and apparatus connected therewith.

Dated April 27, 1854.

955. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in revolving fire-arms. A communication.

957. Sir George Richard Farmer, baronet, of Bideford, Devon. Improvements in safety-valves for steam boilers.

Dated May 1, 1854.

970. Joseph Porter, of Salford, Lancaster, engineer, and Richard Howson, of Manchester, in the same county, engineer. Improvements in forge-hammers.

971. Edward Briggs, of Castleton Mills, near Rochdale, Lancaster, manufacturer, and William Souter, of the same place, manager. Improvements in treating and preparing silk, and in machinery connected therewith.

974. Walter Macfarlane, of Glasgow, Lanark, engineer. Improvements in water-closets, lavatories, dust-bins, and public and domestic conveniences.

975. James Fenton, of Low Moor, Bradford, York, civil engineer. Improvements in safety-valves.

976. James Hamilton, of New York, United States of America. Improvements in machinery for crushing quartz and other substances.

977. William Russell Palmer, of New York, United States of America. Improvements in the construction of spike threshing machines, whereby all liability to, and danger of, accident in their use is removed and prevented, and by which the grain is cleaned from chaff, smut, &c., at the same time it is being threshed.

978. John Clarke, of Leicester. Improvements in knitting machinery.

Dated May 2, 1854.

981. Joe Mayer, of Burslem, Stafford, manufacturer, and John David Kind, of Birmingham, Warwick, manufacturer. An improvement or improvements in attaching door-plates, letters, and figures made of glass, porcelain, earthenware, or other vitreous or semi-vitreous substance to doors and such other surfaces as the same may be required to be attached to.

982. Alfred Trueman, of Swansea, Glamorgan. Improvements in the manufacture of sulphuric acid, when roasting copper ores, and also when burning sulphur or iron pyrites.

983. Richard Waller, of Leeds, York, gentleman. Improvements in valves applicable to steam engines and other purposes, and in apparatus connected with the same.

984. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improvements in moulding, preparing, and finishing articles and fabrics made of compounds of caoutchouc, gutta percha, and other substances. A communication.

985. Carlo Minasi, of Brecknock-place, Camden-town, Middlesex, professor of music. Improvements in apparatus for hatching eggs, and for raising or rearing the young when first produced.

987. Guillaume Dié, of Paris, France. Certain improvements in the manufacture of tracing cloths and tracing paper.

988. Désiré Plisson, of Paris, France. Certain improvements in chemical condensing apparatus.

989. Leon Glukman, of Sackville-street, Dublin, professor of natural philosophy. Improvements in effecting electric communications in railway trains and vessels.

990. Benjamin Bishop and Joseph Dyer, of Birmingham, Warwick. Improvements in the manufacture of stop-butts and other hinges.

Dated May 3, 1854.

991. Thomas Main, of Glasgow, Lanark, engineer. Improvements in steam engines.

992. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in lathes for turning wood and other materials. A communication from Albin Warth, of New York, America.

993. William Westley Richards, of Birmingham, Warwick, gun-manufacturer. An improvement or improvements in loading certain kinds of fire-arms.

994. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in grinding mills. A communication.

995. Eugène Hippolyte Rascol, of Catherine-street, Strand, Middlesex. An improved connection for driving straps, bands, or belts. A communication from Mademoiselle Maria Convents, of Nancy, France.

996. Moses Poole, of the Avenue-road, Regent's-park, Middlesex. Improvements in paving or covering the surfaces of roads, streets, or ways. A communication.

997. William Hyde Knapp, of Cross-street, Islington. Improvements in the manufacture of hats and bonnets.

Dated May 4, 1854.

999. Edward Barlow, of Bolton le-Moors, Lancaster, machine-maker, William Johnson, of Farnworth, in the same county, manager, and William Slater and Peter Knowles, both of Bolton-le-Moors aforesaid, overlookers. Improvements in machinery for preparing and spinning cotton and other fibrous materials.

1001. James Nasmyth, of Patricroft, near Manchester, Lancaster, engineer. An improvement in the process of puddling iron.

Dated May 5, 1854.

1003. Henry Stewart, of Baker-street, Bedford-square, Middlesex. A pocket protector and pocket.

1005. Frank Clarke Hills, of Deptford, Kent, manufacturing chemist. Improvements in the means of preventing or consuming smoke in furnaces.

1007. Adrien Georges Amant Martin, engineer, and Casimir Lefol, of Paris, France. Certain improvements in the manufacture of iron wheels.

1009. Joseph Wonfor, chemist, in the employment of Edward Purser and others, trading under the name of the London Manure Company, Bridge-street, Blackfriars. Improvements in the manufacture of manure.

1011. Vincent Wanostrocht, of Great Tower-street, London. Improvements in the construction of cannon, and in projectiles to be used therewith. A communication.

Dated May 6, 1854.

1012. Thomas William Gibson, of Thomas-street, Stamford-street, Surrey, soda-water manufacturer. Making a new beverage intended to be called "Gibson's pinerium, or aërated sarsaparilla."

1013. Edward John Montagu Archdeacon, of Walworth, Surrey. An improved book-mark or index.

1014. Bernard Joachim La Mothe, of New York, United States of America, doctor of medicine. Improvements in the construction of buildings.

1015. Josiah George Jennings, of Great Charlotte street, Blackfriars. Improvements in the manufacture of earthenware pipes for drains and sewers.

1016. Bernard Joachim La Mothe, of New York, United States of America, doctor of medicine. Improvements in the construction of railroad cars.

1017. Josiah George Jennings, of Great Charlotte-street, Blackfriars. Improvements in apparatus for regulating and supplying water for water-closets and other purposes.

1018. Henry Gregory Drewe, of Paddington, Middlesex. Improvements in obtaining metal from ores.

1019. Richard Waller, of Leeds, York, gentleman. Improvements in engines and apparatus and means of obtaining motive power from liquids, vapours, gases, or air, parts of which invention may be applied also to ordinary steam or other engines.

1021. Charles Cammell, of Cyclops Steel Works, Sheffield, York, steel manufacturer. Improvements in buffer, draw, and bearing springs, for railway carriages, and in the mode of, or apparatus for, making the same.

1023. John Hartley Higginbottom, clerk of works to the Local Board of Health, Ashby-de-la-Zouch, Leicester. Improvements in the valves and apparatus connected with water-closets, certain portions of which are applicable as cocks or valves for other purposes.

Dated May 8, 1854.

1025. John Jefferis, of the Grove, Southwark, Surrey, ironfounder. Certain improvements in packing for pistons, piston-rods, pumps, joints of pipes, and other like purposes.

1027. Henry Moore Naylor, of Birmingham, Warwick, manufacturer. A new or improved instrument for cutting various articles of food.

1029. George Barry Goodman, of Salisbury-place, New-road, Middlesex, importer of foreign goods. Improvements in apparatus for holding together letters, music, and other loose sheets. A communication.

1031. Théodore Lemielle, of Bruxelles, Belgium, civil engineer. Improved apparatus applicable to the ventilation of mines, buildings, and other places.

Dated May 9, 1854.

1033. William Bridges Adams, of Adam-street, Adelphi, Middlesex, engineer. Improvements in rails for railways, and modes of connecting and fixing them.

1035. Charles Liddell, of Abingdon-street, Westminster, esquire. Improvements in moving boats on canals and rivers.

1037. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. Improvements in the manufacture of artificial stone for building, and other purposes. A communication.

Dated May 10, 1854.

1039. William Coles Fuller, of Bucklersbury, Cheapside, London. Certain improvements in the adaptation of Indian-rubber springs.

1043. William Williams, of Dublin, master mariner. An improved propeller.

1045. John Lawson, of Glasgow, Lanark, engineer. Improvements in drawing ships out of water. A communication.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

1086. Frederick East, of Warminster, Wilts, assistant-master in the Warminster Grammar-school. Taking photographic views and portraits in the open air by means of vertible machinery attached to a cubical box, by which the changes are seen, and the light and the time of exposure regulated.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May 19th,* 1854.)

2944. Matthew Parsons Houghton and Andrew Stewart. An improved means of preventing accidents upon railways.

2945. James Septimus Cockings. Improvements in buttons and other dress fastenings, part of which is also applicable for other purposes.

2991. Harris Hardinge. Manufacturing liquid quartz or silex, to be used in the manufacture of certain compositions for ornamental and useful purposes.

(*From the "London Gazette," May 23rd,* 1854.)

2954. Adam Paterson. An improved cooking apparatus.

2957. Henriette Elisa Farion de Gergy Veuve Durut. Certain improvements in the manufacture of bread.
2959. James Boydell. Improvements in the manufacture of wrought iron frames.
2966. Gottlieb Boccius. Certain apparatus adapted to the breeding and rearing of fish.
2978. Benjamin Murgatroyd. Improvements in washing or scouring wool, alpaca, and mohair and fabrics composed entirely or partly of those materials.
2984. John O'Neil. An improvement in apparatus for drawing condensed steam and air from pipes or other chambers in which steam is used.
2993. Joseph Lewis. Improvements in apparatus for drilling or boring metals and other substances.
66. William Watt. Certain improvements in the application of heat to drying purposes.
76. Thomas Edwin Moore. Improvements in apparatus to be used for extinguishing fires.
82. Thomas Frederick Henley. Improvements in the preparation of certain colouring materials.
85. John Henry Johnson. Improvements in the preparation of glycerine, and in its applications. A communication from Victor Courboulay, of Paris, France, chemical engineer.
94. Julius Jeffreys. Improvements in the manufacture of mineral charcoal and coke, and in adapting open grates for the combustion of them.
96. Charles Frederick Stansbury. A new and improved mode of propelling machinery. A communication from Bernard Hughes, of Rochester, New York, United States of America.
113. Bevan George Sloper. Improvements in machinery or apparatus for separating gold from earthy matters.
140. Oliver Rice Chase. Pulverising machinery.
175. George Williams. Improvements in the construction of water-closets.
201. Patrick Moir Crane. An improvement in the manufacture of iron.
270. Robert Brockman Newhouse. Improved apparatus for conducting off the gases of combustion from open fire-places.
361. Patrick O'Connor. An improved lever-hinge for suspending and closing doors and gates.
462. James Keenan. Improvements in forming blocks or surfaces for printing. A communication.
555. William Septimus Losh. Certain means of decoloring resins.
568. John Holley Swan. Improvements in the tuyeres of blast, and other furnaces and fires.
611. John Holley Swan. Improvements in drying bricks, tiles, and other articles made of brick earth.
616. Peter Armand Lecomte de Fontainemoreau. Improvements in heating apparatus. A communication.
656. François Loret Vermeersch. Improvements in looms for weaving.
761. Richard Edward Hodges. Improvements in connecting wheels, drums, cylinders, and pulleys, with their naves, axes, and the parts thereof, one to the other.
817. John Robert Johnson. Improvements in the manufacture of type and other raised surfaces for printing.
820. William Naylor. Improvements in locomotive engines.
821. William Naylor. Improvements in power hammers.
838. Alfred Sohier Bolton and Francis Seddon Bolton. An improvement or improvements in the construction of steam boilers.
839. Alfred Sohier Bolton and Francis Seddon Bolton. A new or improved method of manufacturing certain kinds of metallic tubes.
840. Felix Lieven Bauwens. Improvements in distilling fatty bodies, and in stills or apparatus for such distillation.
871. Henry Meyer. Improvements in looms for weaving.
896. William Denton. Improvements in combing wool and other fibres.
929. Robert Galloway. Improvements in the construction of furnaces.
946. William Collier. Improvements in evaporating pans for concentrating solutions of certain acids, alkalies, and salts.
955. John Henry Johnson. Improvements in revolving fire arms. A communication.
978. John Clarke. Improvements in knitting machinery.
996. Moses Poole. Improvements in paving or covering the surfaces of roads, streets, or ways. A communication.
997. William Hyde Knapp. Improvements in the manufacture of hats and bonnets.
999. Edward Barlow, William Johnson, William Slater, and Peter Knowles. Improvements in machinery for preparing and spinning cotton and other fibrous materials.
1005. Frank Clarke Hills. Improvements in the means of preventing or consuming smoke in furnaces.
1009. Joseph Wonfor. Improvements in the manufacture of manure.
1014. Bernard Joachim La Mothe. Improvements in the construction of buildings.
1016. Bernard Joachim La Mothe. Improvements in the construction of railroad cars.
1023. John Hartley Higginbottom. Improvements in the valves and apparatus connected with water-closets, certain portions of which are applicable as cocks or valves for other purposes.
1086. Frederick East. Taking photographic views and portraits in the open air by means of vertible machinery attached to a cubical box, by which the changes are seen, and the light and the time of exposure regulated.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed May 19, 1854.

2693. Thomas Isaac Dimsdale.
2704. Augustus Radcliffe.
2706. William Joyce and Thomas Meacham.
2716. Charles Ramsay.
2764. Joseph Scipion Rousselot.
2776. Edward Joseph Hughes.
2923. Alphonse Médail.
3026. Henri Catherine Camille de Ruolz and Anselme de Foutenay.

1854.

79. John William Partridge.
157. Charles Clarke Armstrong and William Pursall.
351. John Burt Smith and Edward Smith.
422. William Gossage.
571. Sanders Trotman.

Sealed May 23, 1854.

2720. Henry Robert Abraham.
2728. William Beckett Johnson.
2832. George Ross and James Inglis.

1854.

14. John Collins.

486. William Patten.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

W. W. Wynne.—We are not acquainted with the subject referred to in your second letter. Unless great accuracy is necessary, we should think it would only be necessary to employ a compass, allowing for the deviation due to the position of the place at which it is employed.

A Subscriber since 1837, Dublin.—We shall be able to afford you information concerning the method of plating iron and steel if you will forward us your address.

E. B., Leeds.—You are mistaken in considering the compressibility of water doubtful, since it has been proved to the satisfaction of all philosophers, so far as we have heard, by the experiments of Canton and others.

Errata in last Number—

Page 461, line 4 from top of page, *for* "it," *read* "gravity down the incline."

Page 462, line 9 from top, *for* "(W—)w" *read* "(W—w)."

Page 462, line 35 from top, *for*

$$\frac{\text{“}w - HH'\text{”}}{(W \times w)\cos.a} \quad \textit{read} \quad \frac{\text{“}w \times HH'\text{”}}{(W - w)\cos.a}$$

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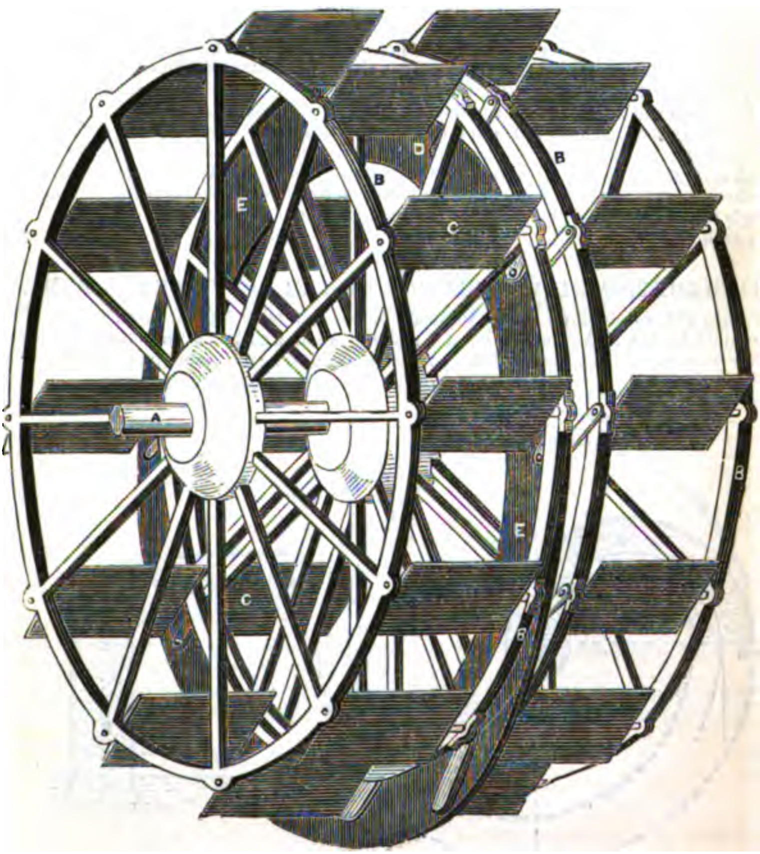
JONES'S PATENT FEATHERING PADDLE-WHEEL.



JONES'S PATENT FEATHERING PADDLE-WHEEL.

Mr. T. L. Jones, of New York, has invented and patented in this and other countries a paddle-wheel in which the floats are always maintained in a vertical position, by means of a heavy ring or rings connected with them by a series of cranks. This arrangement is intended as a substitute for that in which eccentrics and journals suspended to the main shaft are employed, as in Morgan's and other similar wheels.

The engraving on the preceding page represents a perspective view of a paddle-wheel constructed according to Mr. Jones' invention. The wheel is framed generally in the same manner as those in common use, having a shaft, A, and four sets of rings, B B, connected to it by appropriate arms. The floats, C C, are hung on journals which are attached at the middle of the width of the floats. They are also divided in their length into two parts, having a crank, D, between them; or they may be considered as two sets of floats united by the crank hanging between them in the plane of the face of the floats, the whole resting on the rings, B B, by journals on each side of the crank, as well as at the outer ends. The surface of the floats being equal on each side of the point of suspension, they would naturally assume a vertical position by reason of the weight of the cranks. This vertical position would be retained either while in the air or while the floats were entirely submerged in the water; but at the moment of entering or of leaving the water they would have a slight disposition to swerve from the perpendicular, inasmuch as the resistance would then be against one edge only. To obviate this the cranks are all connected to a ring, E, the necessary strength of which affords sufficient additional weight. The action of the wheel cannot thus be deranged unless the floats come in contact with some substance other than water, as ice, timber, &c., in which case it is deemed an advantage that the whole will be capable of yielding temporarily to the shock.

It will be evident that the feathering operation of this wheel is entirely self-acting, being altogether due to the action of gravity; and it is also clear that, although the float is carried around in a circle, its action upon the water will be in a horizontal direction only. The wheel may obviously be constructed in various forms under the same general principle; a single set of floats may, for instance, be used, having cranks at each end, and a ring, E, on each side.

MATHEMATICAL INVESTIGATION OF THE CENTRIFUGAL PUMP.

At page 214, vol. lvii., we gave a summary of the results arrived at in a paper read on this subject by Mr. J. A. Robertson, of London. As the author at that time considered only the case in which the arms of the pump are straight, he has subsequently laid before

Fig. 1.

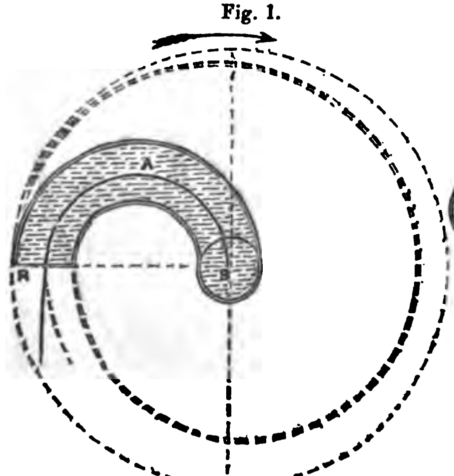
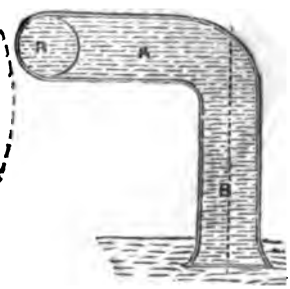


Fig. 2.



the same Institution the following investigation of the general proposition, in which the arms are supposed to be curved, of which that in which the arms are assumed to be straight is, of course, only a particular case:

A centrifugal pump, in its most general form, may be considered as a bent pipe, A, (see figs. 1 and 2), revolving round a suction pipe, B, as a centre, the plane of revolution being either horizontal or vertical, and the curve being wholly in the plane of revolution, as it will be evident from the sequel that no good purpose would be served by the pipe having a double curvature.

In fig. 3, let RPT be the centre line of the arm or pipe revolving round S in the direction of the arrow, the sectional area of the arm being uniform throughout.

ST the radius of the suction pipe$=R_1$,
SR the radius of the circle described by the extremity of the arm$=R_2$,
$a=$the angular velocity,
$\theta=$the angle PSX,
$r=f(\theta)$ the polar equation to the curve of the arm,
and $s=$the length of the curve.

Fig. 3.

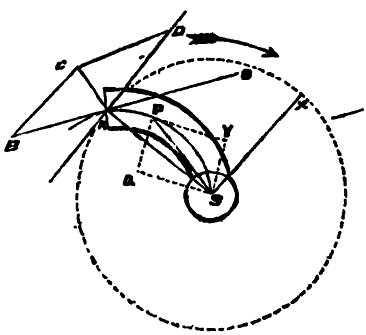
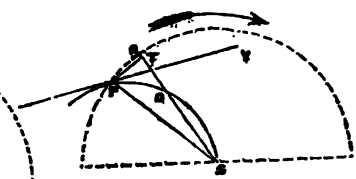


Fig. 4.



Let the sectional area of the pipe be constant and equal unity.

Then the weight of an elementary portion of the contained water is represented by its length;—which, taken with reference to the angle described by the radius vector, is

$$\frac{ds}{d\theta}$$

Since the element at P revolves in a circle of which the radius is SP, the centrifugal force is represented by

$$\frac{a^2}{g}\,\mathrm{PS}\times\frac{ds}{d\theta}=\frac{a^2}{g}\,r\,\frac{ds}{d\theta},$$

but by the principles of the differential calculus

$$\frac{ds}{d\theta}=\sqrt{r^2+\frac{dr^2}{d\theta^2}}.$$

$$\text{Therefore the centrifugal force}=\frac{a^2 r}{g}\sqrt{r^2+\frac{dr^2}{d\theta^2}}\ldots\ldots\ldots\ldots(1.)$$

This force acts in the direction SP, and in order to ascertain its effect in propelling the water along the pipe, it must be resolved into two others,—one in the direction of the tangent to the curve—the other at right angles to it.

If PS represent the amount of the centrifugal force, as well as its direction, PQ will represent the force expended on the material of the pipe, and PY that which urges the water above it.

The perpendicular on the tangent of a polar curve is represented by

$$\frac{r^2}{\sqrt{r^2+\frac{dr^2}{d\theta^2}}},$$

$$\text{Hence PY}=\sqrt{\mathrm{SP}^2-\mathrm{SY}^2}=\sqrt{r^2-\frac{r^4}{r^2+\frac{dr^2}{d\theta^2}}}=\frac{r\frac{dr}{d\theta}}{\sqrt{r^2+\frac{dr^2}{d\theta^2}}}$$

The Force along PY : Centrifugal force : : PY : PS,

$$\text{or Force along PY} : \frac{a^2 r}{g} \sqrt{r^2+\frac{dr^2}{d\theta^2}} : : \frac{r\frac{dr}{d\theta}}{\sqrt{r^2+\frac{dr^2}{d\theta^2}}} : r$$

$$\text{Therefore force along PY} = \frac{a^2 r}{g}\frac{dr}{d\theta}\text{..................(2.)}$$

Since the sectional area has been supposed equal throughout the length of the arm, the water must, in order to preserve its continuity, move with the same velocity at all points; therefore the whole force urging the water as one mass along the arm, is the sum of all the forces acting on the individual elementary portions.

Now the sum of all the forces represented by equation (2) is the definite integral of that equation between the limits $r=R_2$ and $r=R_1$.

Therefore the whole force producing a flow through the arm

$$=\frac{a^2}{g}\int_{R_1}^{R_2} r\frac{dr}{d\theta}=\frac{a^2}{2g}\left(R_2^2-R_1^2\right)\text{...................(3.)}$$

or it is precisely the same as if the arm were straight.

The effect of a varying section of a pipe will be discussed afterwards; but, supposing the section to be uniform, the water contained between two consecutive blades of Mr. Appold's pump (fig. 6) is in exactly the same condition as that contained in this pipe. It must consequently be evident that until the force urging the water outwards be greater than the pressure of the working head (the height of the discharge above the surface of the water to be raised), no motion outwards can take place.

Whatever be the angular velocity, therefore, there is always a certain head which will be just supported, and no more, and the cause of its being supported is centrifugal force.

If, then, whilst the velocity remains constant the head be diminished, a flow will take place; and there can be no reason for supposing the mode of action to change and become that of an inclined plane. It must, therefore, be admitted to be centrifugal action throughout, and the velocity through the arm is that due to the excess of the centrifugal force above the working head, and is equal to

$$\sqrt{2g\left\{\frac{a^2}{2g}\left(R_2^2-R_1^2\right)-h\right\}}=\sqrt{a^2\left(R_2^2-R_1^2\right)-2gh}$$

Let $a\,R_2$ the velocity of the outer extremity of the arm be V_2

aR_1 ditto inner ditto ditto V_1

and let $2gh=v^2$;

then the area of section being unity, the discharge per second is

$$\sqrt{V_2^2-V_1^2-v^2}.$$

The direction in which the water would move when it leaves the arm, would, if there were no circular motion, be that of the arm itself, or a tangent to the curve at the extremity.

Let SR, in fig. 3, be the arm,

BRO a tangent to the curve of the arm at R;

Let BR represent the velocity of discharge,

and RD a tangent to the circle described by R represent the tangential velocity;

then RC is the actual motion in space in magnitude and direction.

$$RC^2=RB^2+BC^2-2\,RB\,.\,BC\cos. RBC$$

$$=\left(V_2^2-V_1^2-v^2\right)+V_2^2-2\,V_2\sqrt{V_2^2-V_1^2-v^2}\cos. RBC.$$

Let the angle SRO, which the radius vector makes with the tangent to the curve, be ϕ.

$$\text{then the angle RBC}=\frac{\pi}{2}-\phi,\text{ and }\cos.\left(\frac{\pi}{2}-\phi\right)=\sin\phi.$$

$$\text{Therefore } RC^2=2\,V_2^2-V_1^2-v^2-2V_2\sqrt{V_2^2-V_1^2-v^2}\sin.\phi.$$

Then the numbers of units of work expended upon communicating to the water the velocity with which it leaves the pump, is

$$U_1 = \frac{\left(2V_2^2 - V_1^2 - v^2 - 2V_2\sqrt{V_2^2 - V_1^2 - v^2}\ \text{sin.}\ \phi\right)\sqrt{V_2^2 - V_1^2 - v^2}}{2g}$$

and the number of units of work expended on raising the water delivered to the height of discharge, is

$$U_2 = \frac{v^2}{2g}\sqrt{V_2^2 - V_1^2 - v^2}$$

Therefore the whole power

$$U_1 + U_2 = \frac{\left(2V_2^2 - V_1^2 - 2V_2\sqrt{V_2^2 - V_1^2 - v^2}\ \text{sin.}\ \phi\right)\sqrt{V_2^2 - V_1^2 - v^2}}{2g} \ldots\ldots(4.)$$

$$\text{The useful effect} = \frac{v^2}{2g}\sqrt{V_2^2 - V_1^2 - v^2}$$

Therefore the ratio of useful effect to the power expended is

$$\frac{v^2}{2V_2^2 - V_1^2 - 2V_2\sqrt{V_2^2 - V_1^2 - v^2}\ \text{sin.}\ \phi.} \ldots\ldots\ldots\ldots\ldots\ldots(5.)$$

When $\phi = 0$, or the arm terminates in the direction of the radius, and if V_1 be considered so small that it may be neglected, the expression becomes

$$\frac{v^2}{2V_2^2}$$

which is the ratio given in the former paper for a pump with straight arms.

Equation (5) is evidently a maximum, or the duty is greatest when sin. ϕ is a maximum, or when $\phi = 90°$ the expression then becomes

$$\frac{v^2}{2V_2^2 - V_1^2 - 2V_2\sqrt{V_2^2 - V_1^2 - v^2}}$$

the value of which evidently increases as v diminishes, or the economy is greater the lower the lift.

It appears, then, that in order to get the greatest ratio of useful effect, the angle ϕ must be 90°,—that is, the arm must be bent back until the tangent at its extremity coincides with the tangent to the circle described by it. Hence the velocity of exit is directly opposed to the tangential velocity, and consequently the actual velocity of the water is the difference between the two velocities.

If $v = 0$, or there be no head, and the diameter of the suction pipe be so small that V_1 may be neglected, the velocity of discharge equals the tangential velocity, and the water drops off at rest.

We have here, then, an explanation of the economy arising from the use of *curved blades.* When the arms are straight, the loss can never be less than one-half the power, because one-half is absorbed by the tangential velocity, and the only means of raising the per centage of useful effect, is by *diminishing* the *velocity of discharge.* But with *curved arms* it is quite the reverse; the *greater the velocity* of discharge, the less is the difference between it and the tangential velocity.

It is necessary to remark here, that in this inquiry it has been assumed that only that water which is between the blades has a rotatory motion, and that the centrifugal force, and consequently the column balanced by it, are less than if the blades extended completely to the centre. Now this is not exactly true, for it is evident that a certain amount of rotatory motion will be communicated to the water in the entrance by contact with the sides, and that part of the water which is revolving. The amount of this motion it is impossible to determine, but it will probably be proportionately greater the less the velocity through the pump.

The following Table is calculated to show the variation of effect produced by a variation in height of lift—supposing the direction of the arm at the extremity to be a tangent to the circle described by it, V to be neglected, and the velocity of the extremity of the arm to be 32·2 feet per second—

HEIGHT OF LIFT.	PER CENTAGE OF EFFECT, POWER BEING 100.
3 feet	93
6 „	90
9 „	83½
12 „	75
15 „	63
16 „	No delivery.

Although, as we have seen, the nature of the curve of the arm is a matter of no consequence as far as the principle is concerned, it must be more important in practice.

The form which would cause the water to move in a straight line from the centre to the circumference, would evidently be the best. This can be given only when there is no lift, that is when the velocity of delivery is equal to that of the end of the arm; but the curve which suits this case will give the nearest approximation at all other velocities of delivery.

Let PO, in fig. 4, be a portion of the arm revolving round the centre, S,—
let the velocity of flow through the arm be uniform and equal to c,—
a being the angular velocity of the pump,
$a\,r$ is the actual velocity of the point P.

Then if PO bear the same proportion to PR (the portion of the circle described by P round S), that the velocity c does to the velocity of P; the particle of water which at the commencement of the motion was at O, will reach P at the same instant that P reaches R,—that is, the particle at O will have moved through space along the line OR.

Let PY be a tangent to the curve of the arm.
the angle SPY$=\phi$,
then PT$=$PO sin. $\phi=$PS sin. PST.

But the angle PST may be indefinitely diminished, and then the ratio of the line to the arc becomes one of equality; so that

PO sin. $\phi=$PS $\delta\theta$, when $\delta\theta$ is the differential of the arc.

Then make $\quad$ PO : PS $\delta\theta$ :: c : $a\,r$

or $\quad \delta s : r\delta\theta :: c : ar$

$$\therefore \frac{\delta s}{\delta\theta}=\frac{ds}{d\theta}=\frac{c}{a}$$

$$\text{whence by integration } s=\frac{c}{a}\,\theta \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (7.)$$

$$\text{Therefore} \quad \frac{ds}{d\theta}=\sqrt{r^2+\frac{dr^2}{d\theta^2}}=\frac{c}{a}$$

$$\text{whence} \quad \frac{dr}{d\theta}=\sqrt{\frac{c^2}{a^2}-r^2} \text{ and } \frac{d\theta}{dr}=\frac{1}{\sqrt{\frac{c^2}{a^2}-r^2}}$$

$$\text{Therefore } \theta=\sin.^{-1}\frac{ra}{c}$$

$$\text{and } r=\frac{c}{a}\sin.\theta \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

which is the equation to the curve.

This differs from the spiral of Archimedes, as the equation to that curve is $r=m\,\theta$.

From equation (8) we have sin. $\theta=\frac{ar}{c}$ or $\theta=90°$ when $c=ar$, that is when the velocity of discharge is equal to the velocity of the arm.

In this case we find from (7) that $s=\frac{c}{a}\,\frac{\pi}{2}=r\frac{\pi}{2}$ or the length of the arm is a quadrant of the circle described by the extremity.

Hitherto the sectional area of the arm has been supposed constant;—the next question for examination is what effect is produced by a variation of the section.

A *solid* of the form of the water contained in an arm of variable section, would have a centrifugal force dependent upon the position of the centre of the gravity; but it is evident that the column which the centrifugal force of the *water* will balance, will be the same whether the section be uniform or variable, upon the same principle that the pressure per square inch produced by a vertical column is independent of any variation in the section of that column, and dependent only on its height.

It follows, therefore, that the column which is available for the production of the velocity of discharge, namely the difference between the column representing the centrifugal force, and the height of the orifice of discharge above the surface of the water in the cistern, is the same, whether the section of the arm be constant or variable.

If the section diminishes towards the outer extremity, the velocity will increase; if the section increases, the velocity will diminish. But as the velocity produced by a given column can only be that due to the height of the column, it must in the first instance be considered as divided into two parts—one producing the velocity with which the water must be added at the entrance of the pipe, the other producing the acceleration; in the latter case the water is dragged through the entrance with a velocity greater than the ultimate velocity, and loses it in its passage through the pipe by communicating in its turn excessive velocity to the water entering. There appears, therefore, to be no advantage in principle in giving to the arm a variable section.

Fig. 5.

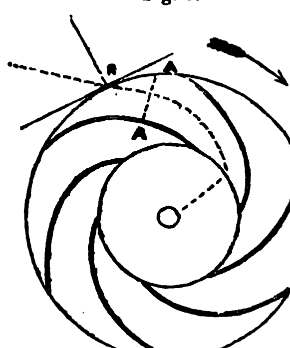
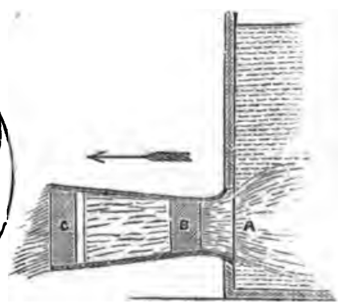


Fig. 6.



In corroboration of this view of the subject, the experiments of Venturi may be appealed to. It is well known that when a conical pipe, as A B in fig. 5, was attached to an orifice in a vessel kept constantly full, the discharge was due to the head of water above the centre of the pipe and the area of the orifice B. But when a diverging conical pipe, B C, was added, the discharge was considerably increased. This increase of delivery has been attributed to the attraction of the sides of the pipe for the water, but this is a cause wholly inadequate to the effect. It is clear that whatever be the velocity of a particle at B, it is diminished when it comes to C in the same proportion as the sectional area is increased. But no effect can be produced without a cause: some retarding force must, therefore, have been in operation.

Suppose the velocity to continue the same;—the portion of water at B (section lined) becomes thinner as it advances along the expanding pipe to C, and according to the supposition, the continuity of the water will be broken, and a space left between all the elementary portions into which the water may be supposed to be divided. But the space so left (shown white) would be a vacuum, and consequently the pressure of the atmosphere would be exerted to propel the particles at B faster, and check the velocity of those in advance.

It must, therefore, be evident that the effect will be that the continuity of the water is preserved, and the motion of the particles at B increased considerably beyond what it would otherwise have been.

For the production of this effect it is necessary that the pipe be of such a material that there may at least be no repulsion between it and the water, as in that case the water would not flow in a full stream; and it must moreover be evident that if it were not for friction,

the velocity of discharge at C would be precisely the same as if the orifice B had had the same size, and there had been no additional conical pipe. In practice friction has a considerable influence, and the delivery is accordingly less than that due to the head and the area at C.

From equation (6) it appears that, *ceteris paribus*, the economy is greater the smaller V is; that is, the smaller the diameter of the suction-pipe. But if this pipe were made very small, power would be lost in communicating to the water an unnecessary velocity, and therefore it follows that the most advantageous proportion is when the area of the suction-pipe at the entrance of the arm is just equal to that of the arm, and that the per-centage realized with one arm will be greater than when there are several. It also follows that it is more advantageous to increase the diameter of the pump than the angular velocity.

In Mr. Appold's pump the diameter of the suction-pipe bears a large proportion to the diameter of the disc, being as much as one half. It will likewise be evident from the engraving, fig. 6, of this pump, that the channel formed by two contiguous blades, A A, does not terminate at R in the direction of a tangent to the circle described by the extremity, but makes a considerable angle with the tangent. It may, therefore, be expected that a higher per-centage may yet be realized than is shown by the experiments of the jury of the Great Exhibition.

THE MANUFACTURE OF IRON.

Dr. Noad, Lecturer of Chemistry at St. George's Hospital, recently delivered a lecture at the Royal Institution, on the Manufacture of Iron. The history of this important metal was first briefly sketched; it was shown by reference to the four books of the Mosaic law, that it was known and used in the earliest ages of the world: from various passages in Hesiod, Homer, and Æschylus it was rendered probable that the ancient Greeks, though acquainted with both iron and bronze, used the latter in the construction of their warlike weapons till the period of the Heroic Ages; but that after that time bronze was superseded by iron obtained from the Chalybes: and from passages from the writings of Polybius, Pliny, and Diodorus, the conclusion was drawn that even in the earliest times the Romans used weapons of iron, which they obtained principally from Spain. It was mentioned, on the authority of Mr. Arthur Aikin, as a curious fact, that cutting and even surgeons' instruments were found in the excavations at Herculaneum and Pompeii, made of *bronze*, though some were also found of iron; from which it was to be concluded that at this period (about the year 59) the great superiority of iron over every other kind of metal in the manufacture of cutlery was only partially acknowledged.

A glance was next taken at the different ores of iron. Upwards of forty species have been described, the metal occurring in all rocks, into the composition of the greater number of which it enters as a base to silicic acid.

The following ores (as the most important) were exhibited and described:

1°. *Specular, oligistic, and micaceous iron*, of which there are several varieties, differing greatly in appearance; but all, when pure, represented by the formula $Fe_2\,O_3$. The principal localities in this country are Ulverstone, in Lancashire, where it often occurs in large botryoidal masses, and is hence called kidney ore; and the Forest of Dean, where it is much mixed with carbonate of lime: the specular variety is found in Cornwall. This variety of ore always yields good and strong iron; it greatly improves all inferior ores, and forms an excellent flux in the blast furnace. It is from the specular ore that the celebrated "damask iron" of Persia, and the "wootz" of India are manufactured.

2°. *Hydrated oxide, or brown Hæmatite.*—This ore, which usually contains about 14 per cent. of water, and is represented by the formula $2\,Fe_2\,O_3 + 3\,HO$, is not found in any quantity in this country, though it occurs at Alston Moor and in Durham; it abounds, however, in Normandy, Berry, Burgundy, and Lorraine, and supplies the greater number of the French iron-works.

3°. *Aimantine, or magnetic Iron ore.*—This ore, the richest of all in metal, and composed of $Fe\,O + Fe_2\,O_3$, is not found in any abundance in this country. It exists plentifully in Norway and Sweden, in Germany, in India, and in the states of New York and New Jersey, in America. The iron furnished by it is of the finest description.

4°. *Carbonates.*—Of the pure white carbonate, *Spathoze iron, side-rose* or *iron spar*, we do not possess any large quantities in this country. It has lately, however, been found in Somersetshire, and is remarkable for containing a large per centage of manganese.

The Ironstone of the Coal formations.—It is to the richness of our coal-fields in the argillaceous and blackband ironstone, that the surprising increase in the production of iron during the last hundred years is to be

attributed. It is calculated that this ore supplies nine-tenths of the entire iron produced. It is not found in all coal-fields; those of Northumberland, Durham, Lancashire, Leicestershire, and Somersetshire do not furnish any important supplies. The coal-basin of South Wales, comprising an area of 1,045 square miles, yields the largest quantity of iron; then follow Staffordshire, Shropshire, Yorkshire, Derbyshire, and North Wales. This ore is especially valuable, from its occurring in close proximity to the very materials required for its smelting, viz., to coal and limestone. It is frequently found in egg-shaped masses of various sizes; and on carefully splitting these in a longitudinal direction, it is not unusual to find in the centre, as a sort of nucleus round which the carbonates of iron and lime and of clay have arranged themselves, a shell or a vegetable remain.

The *Oolitic Ironstones* of Northamptonshire are also beginning to excite considerable attention. They are found, in largest quantity and best quality, along the Northampton and Peterborough line from Higham Ferrers to Hardingstone, near Northampton; and from Gayton, near Blisworth, to Towcester. They are of very varied character, and the per centage of iron which they contain ranges from 20 to 55 per cent.

Treatment of the Coal measure Ironstone.—The ore occurs in beds of varying thickness, and generally inclined to the horizon. There are usually several beds or seams, one beneath another, separated by beds of other minerals; and in all such cases every bed has a local name, frequently of a very fanciful nature, applied to it. The ore is stacked and exposed for some months to the weather, during which time the outer coating, containing but a small quantity of iron, cracks and falls off. The first process that it undergoes is that of roasting, which is performed either in the open air or in kilns, the latter being most effectual. By this process it loses *water and carbonic* acid, the loss of weight being about 25 per cent.; and the iron, from being in the state of carbonate, is brought into the state of peroxide, and is now in the form of a red, more or less porous mass, a state in which it can be acted upon more readily in the furnace. By roasting, the ore also loses the sulphur, though the ironstones of Cwm Celyn, to which the Lecturer's attention has been more particularly directed, contain very small quantities of that pernicious element.

The amount of carbonate of iron in the coal measure ironstones varies from 50 to 80 per cent., the other constituents being silica, alumina, lime, and magnesia, with minute quantities of sulphur, phosphorus, and potash.

The blast-furnace was next described. The outer stack is composed of stone or brick, within which is a casing of masonry about fourteen inches thick, which, when the furnace requires to be renewed inside, admits of being taken down and rebuilt without injury to the outer fabric; next comes a space of about six inches, filled with river sand compactly rammed in, which, being a bad conductor of heat, tends to preserve the casing of masonry; lastly, a coating of best fire-brick, about fourteen inches in thickness.

The following are the names and dimensions of the internal parts of the furnace:—1st. The *hearth*, which may be from three to six feet in width. 2nd. The *boshes*,—height from twelve to sixteen feet, width from twelve to fifteen feet. 3rd. The *cone* or *cavity*, height from thirty to thirty-six feet; total height of the furnace from forty-five to fifty feet. The furnace, when in full work, contains upwards of one hundred tons of materials, to supply the requisite heat for which, a powerful and constant blast of air is sent in at three or four different sides through tubes surrounded with a stream of cold water, and which are called "Tuyeres." Some of the large Welsh furnaces consume upwards of 20,000 gallons of air per minute, a quantity exceeding in weight the totals of all the solid materials used in smelting. The blast enters the furnace under a pressure of from two to three pounds and a half to the square inch, and (unless previously heated) at a lower temperature than the external air, in consequence of its compression in the blowing machine, by which latent heat is separated and lost, which heat it again obtains at the expense of surrounding objects, as it escapes in its recovered state of expansion from the Tuyere. It is almost the universal rule, however, at the present time to heat the air to about 600° before it enters the furnace, by which an effective increase of about ⅙th or of 360° F. is obtained. The influence which this capital improvement (first introduced about twenty-five years ago by Mr. Neilson at the Clyde Iron-works) has had on the iron manufacture has been immense. It has in many cases enabled manufacturers to increase their weekly production of iron 50 per cent., and to produce a better sort of cast-iron from inferior materials. It has effected a great saving of fuel; and it has enabled the Scotch iron-masters to smelt alone and with coal the *black band* iron-stone discovered by Mr. Mushet in 1801.

The great importance of the hot blast, and the influence of an uniform temperature on the working of the furnace, is well shown by the following statement, furnished by F. Levick, Esq., the intelligent manager of the Cwm Celyn and Blaina Works.

It is to be understood that both furnaces were making *white* or forge iron, to be afterwards manufactured into railway bars.

No. 1. *Furnace at Cwm Celyn;—One Week's Work, ending 7th April*, 1854.

The blast was not sufficiently heated, the blast stoves being out of repair, and the furnace was "scouring."

Charges driven, 652. *Iron made*, 181 tons 9 cwt.

Consumption of fuel on the ton of iron made.

	Cwt.			Tons.	Cwt.		Cwt.
Coal burthen	10	378 charges	=	189 ..	0	=	20·88
Coke „	6½	274 „	=	88 ..	11	=	9·78
	16½	652					30·66

Mineral burthen.

		Tons.	Cwt.		Cwt.
Limestone	1 cwt. . .	32 ..	12	=	3·60
Welsh Mine	10 cwt. . .	326 ..	0	=	36·02
Red ore	1 „ . .	32 ..	12	=	3·60
Cinder	4 „ . .	130 ..	8	=	14·40
	15 cwt.	489 ..	0		54·02 =

= Consumption of iron minerals per ton of iron made.

No. 2. *Furnace at Cwm Celyn;—One Week's Work, ending 7th April*, 1854; *working well.*

Charges driven, 652. *Iron made*, 236 tons 16 cwt.

	Cwt.			Tons	Cwt.		Cwt.
Coal burthen	10	380 charges	=	190 ..	0	=	16·03
Coke	6½	272 „	=	81 ..	12	=	6·88
		652					22·91 =

= Consumption of fuel per ton of iron made.

Mineral burthen.

		Tons.	Cwt.		Cwt.
Limestone & $\frac{1}{2}$ cwt. } . .		46 ..	4	=	3·89
Welsh mine	11 cwt. . .	358 ..	12	=	30·26
Red ore	2 „ . .	65 ..	4	=	5·50
Cinders	6 „ . .	195 ..	12	=	16·50
	19 cwt.	619 ..	8		52·26 =

= Consumption of minerals per ton of iron made.

From this statement it appears that with the same number of charges, No. 2 made during the week 55 tons 7 cwt. more iron than No. 1; that while No. 1 took nearly 31 cwt. of fuel to make a ton of iron, No. 2 took only 23 cwt.; that No. 1 carried a "burthen" of 15 cwt. of iron minerals on each charge of fuel, and No. 2, 19 cwt.; and that while No. 1 required 54 cwt. of iron minerals to make one ton of iron, No. 2 required 52 cwt. 26 lbs. only.

The colour, consistence, and general appearance of the *scoriæ*, *cinders*, or *slag*, are to the furnace manager good general indications of the manner in which his furnace is working. When *white* iron is being made, a good cinder will have a clear olive green colour, and will flow regularly and smoothly from the tap-hole; a "scouring" cinder on the other hand, such as was flowing from No. 1, is thick, runs from the tap-hole with difficulty, has a dull, nearly black colour, and is very heavy; in fact analysis shows that it contains 20 per cent. of oxide of iron. The cinder from the *gray* or foundry iron furnace has altogether a different appearance, but both *white* and *gray* cinders are nearly as interesting to the chemist and mineralogist as they are to the iron manufacturer. They are received from the furnace in large iron boxes, whence, as soon as they have solidified, they are removed on railroads to be used for the construction of roads, rough walls, &c. The outside of the cinder lumps, "donkeys" as they are called by the workmen, have a vitreous fracture; but the interior, where the cooling process has taken place very slowly, is stony, and usually contains cavities which are lined with crystals; those from white iron have a composition which places them among the *pyroxene* or *augite* class of minerals; those

from grey iron are more nearly allied to *idocrase*.

The iron from the blast furnace is usually "tapped" twice in twenty-four hours; the liquid metal is either received into moulds where it assumes the form of semi-cylindrical bars, technically called "pigs," or it is run into wider channels from which, after being broken up, it is removed directly to the "refinery."

The "cinders" alluded to in the above statement of the mineral burthens of the two Cwm Celyn furnaces, are not the cinders of the blast-furnace but "forge cinders;" that is, the cinders that separate rom the cast iron during the processes of "refining," "puddling," and "balling," by which the cast iron is converted into wrought iron. These cinders are very rich in iron, which exist principally in the form of silicate of the protoxide; they often occur beautifully crystallized, particularly after they have been "calcined," an operation which is now always performed on them in well-conducted works, and which has for its object the removal of the sulphur and the peroxidation of a portion of the iron: the tendency of sulphur even when it exists in iron in very small quantity, is to make the metal what is called "hot short," so that it cannot be worked under the hammer; the tendency of phosphorus, another element always found in "forge cinders" is to make the iron "cold short," so that it breaks on attempting to bend it. The separation of sulphur, by calcining, is very perfectly effected, and it is interesting to trace the process of its gradual elimination; in some places large masses of prismatic crystals of pure sulphur are seen, but usually nearly the entire surface of the heap is covered with a thin layer of sulphate of iron, sometimes crystallized, but generally in various stages of decomposition; lower down in the heap, where the heat is greater, the sulphate of iron disappears, and in its place "colcothar" is found. The separation of phosphorus from the forge cinders is still a desideratum.

(To be continued.)

AN ANGLE-TRISECTOR AND QUINTSECTOR;

OR, AN INSTRUMENT FOR FINDING THE THIRD AND THE FIFTH PARTS OF AN ANGLE.

BY MR. C. J. RECORDON.

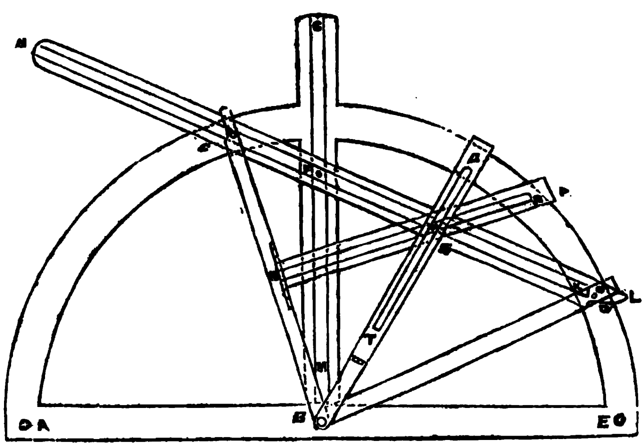
The instrument about to be described is produced by the mere addition of two new parts to the Angle-Trisector described, *Mech. Mag.* p. 418, current volume; we may therefore refer again to the diagrams there employed in illustrating that instrument.

We have already seen that

$$\angle DBE = \tfrac{1}{3} \angle ABC;$$

$$\text{and } \angle BCD = \angle BDC = 2 \angle DBE.$$

A new piece NP (see accompanying diagram) is now added in the middle of BC, to



which it is perpendicular; it is of the same thickness as BC, and is on a level with it, so that it lies also on HL. Another new part, BQ, is placed at B on CBL, turning on the prolongated axis B, and lying on NP. These two new pieces have slots, NR and TV, of the same breadth cut in them, and a piece sliding in the groove HK, car-

ries a vertical round pin which fits in both of these slots. The geometrical axis at G must of course represent the intersection of a plane, perpendicular on BC, and at equal distances from B and C, with a vertical plane passing through B. The point Q must be supposed to lie in the latter plane at a distance from B equal to BA. A, C, and G must also be supposed to lie on a level with BQ, E on a level with D, and the axes at C, F, G, and D must be made always to lie in a plane.

We will now prove that $\angle DBE = \frac{1}{5} ABQ$, supposing for a moment ED to be on a level with BQ. From the construction of the instrument it follows that

$$GC = GB,$$
$$\therefore \angle CBG = \angle BCG.$$
$$\text{But} \quad \angle ABC = 3 \angle DBE;$$
$$\text{and} \quad \angle BCG = \angle BDC = 2 \angle DBE;$$
$$\therefore \quad \angle ABQ = \angle ABC + \angle CBG$$
$$= 3 \angle DBE + 2 \angle DBE$$
$$= 5 \angle DBE;$$
$$\text{or} \quad \angle DBE = \frac{1}{5} \angle ABQ.$$

Q. E. D.

Angle ABQ may be of any size between limits lying near 0° and 150°; and the fifths of angles not falling within these limits may be easily deduced from those of their complements or supplements. The limits of ABC would not be near 0° and 90°, so that the thirds of very small angles could not be deduced from the thirds of either their complements or supplements. In this case the given angle could be considered as difference of two other angles to which the instrument could be applied, and one of them might be 45° or 60°; then we should have to trisect two angles instead of one. An easy means of avoiding this inconvenience would be to hinge the pieces BQ and NP near B and N, so that they might be turned back, so as to allow ABC to come near 135°.

To apply the instrument as a quintsector, move B Q until A Q be the chord of a given angle for radius B A, then D E will be the chord of one-fifth of this angle for the same radius. As trisector it is applied as before.

A limit of angle, D B E, being evidently near 30°, a limit of angle, C B G, will be near 60°, and therefore a limit of B G will be near B C or B Q, whilst the other is near one-half B C. The limits of the distance of G from B C will be near O and $\frac{\sqrt{3}}{2} \cdot BC$.

The merits of instruments of the kind described consist in the exactness of their operations, and in their elegance and simplicity.

Scholium.—A rhomboidal system with B Q and its prolongation as diagonal, and B C as one side, could be imagined for the purpose of making on the other side of B Q an angle equal to C B Q, and thus of obtaining a line making with B A an angle equal to 7 $\angle$ D B E. An analogous combination might be derived from this, for obtaining an angle equal to 11 $\angle$ D B E, and so on. But these combinations, possible in theory, become impossible in practice.

SANITARY IMPROVEMENT IN THE MANUFACTURE OF GAS.

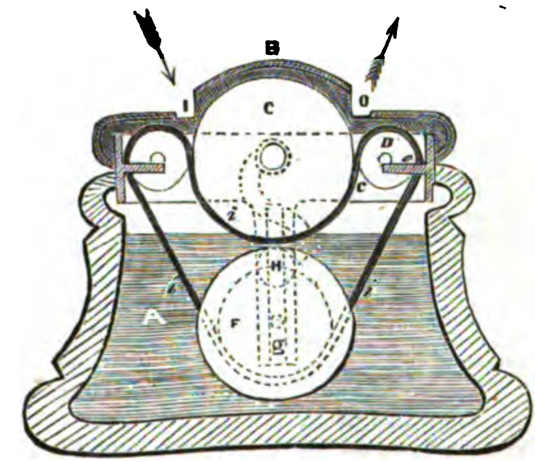
It is well known that the saturated lime, taken from the dry-lime purifiers, employed in the manufacture of gas, when exposed to the atmosphere, exhales a considerable portion of the sulphuretted hydrogen which it has abstracted from the impure gas passed through it. By this means there are transferred to the air large quantities of a gas which is exceedingly deleterious to animal life, and which, from the excess of its density above that of air, sinks to the lower atmospheric strata, whence it is often inhaled to the great injury of the inhabitants of towns and cities. In order to remedy this, Mr. Mann, engineer of the City of London Gas-light Company, has invented the following arrangement. Before the vessel is opened for the removal of the screens, atmospheric air is blown through the purifier. This air, as it passes through the saturated lime, of course bears away with it those portions of the impurities which would fly off if the lime were opened to the atmosphere in the usual way. The air thus impregnated with the sulphur compounds is conveyed to a suitable vessel containing a material which will decompose them, and retain them within it. As sulphuretted hydrogen is the principal agent to be dealt with, oxide of iron is the material chosen; the hydrogen of the compound unites with the oxygen, forming water, and the sulphur unites with the oxide of iron, forming sulphide of iron. The partial removal of the sulphuretted hydrogen from the spent lime, by means of currents of air passed through it, has before been practised, but with only a limited benefit, since the charged air has been sent up the shaft to be subsequently liberated; while the present invention, by decomposing the deleterious gas, altogether prevents its passage to the atmosphere, and the evil effects which result from its diffusion. The system is at present in successful practice at the Company's works.

BADDELEY'S PATENT POSTAGE, RECEIPT STAMP, AND LABEL DAMPER.

(Patent dated June 16, 1853.)

THE general use of adhesive stamps in payment for postage, receipts, Chancery and other fees, as well as the extensive use of gummed tickets for innumerable purposes, renders a ready and effectual mode of damping them very desirable. When a large number of labels have to be damped, the operation of "licking," at all times exceedingly objectionable, becomes inconvenient, and has upon several occasions produced serious and alarming consequences—not, as is commonly but erroneously supposed, from any poisonous matter in the adhesive material, but from the rapid extraction of saliva from the system. A damper, therefore, becomes necessary, and to be perfect it is essential that it should moisten *both sides of the label;* otherwise, the expansion of the adhesive surface only will cause it to curl up and detach itself from the article to which it is wished to affix it. This will take place with paper of the thinnest description, but if the paper is of any considerable thickness (as the foreign postage stamps are), it is almost impossible to get the label to adhere until both surfaces have been moistened. An apparatus has been patented by Mr. Baddeley, which appears to meet all the requirements of the case in a very satisfactory manner. Postage stamps and adhesive labels of all kinds, after passing through this apparatus, lie quite flat, and attach themselves immovably to any article to which they are applied. To persons sending off numerous letters, circulars, &c., or using gummed tickets extensively, such an apparatus cannot fail to be extremely useful.

The accompanying engraving represents a section of a label-damper, constructed ac-



cording to his invention. A, is a cistern or reservoir for holding water, constructed of glass, earthenware, or other suitable material. B is a cover. C is a roller mounted upon a spindle, which turns in bearings in the metal ring, *c c.* D D are two small rollers, the axes of which rest upon shelves, *e e.* F is another roller, the axes of which work in two vertical grooves, *g.* The roller, C, is turned by a handle upon the spindle, shown in the dotted lines, H. An elastic endless band, *i i i*, passes under the roller, C, and encloses the rollers, D D and F, so that, when the roller, C, is turned round, the others turn also.

In the cover, B, there are two apertures, I and O.

The reservoir, A, being filled with water, the stamp, label, or gummed ticket is to be put in at the opening, I, and the handle, H, turned round; the stamp or label will pass down under the roller, C, through the water, up on the opposite side, and out through the opening, O, properly damped for affixing. When the water sinks below the point of contact of the rollers, C and F, the label will not then pass through the water, but will nevertheless be effectually damped by contact with the wet surfaces of the rollers, so long as any water touches the roller, F. The use of this label-damper is to moisten the label, stamp, or ticket, simultaneously on both sides, whereby all tendency of the label, &c., to curl up, by unequal expansion of the upper and lower surfaces, is prevented, and perfect adhesion ensured.

ON THE CASUALTIES OF TUNNELLING.

At a recent meeting of the Institution of Civil Engineers, a paper "On the Casualties of Tunnelling, with examples," was read by Mr. W. M. Peniston, M. Inst. C.E., and was in reality a relation of the difficulties encountered in the formation of some tunnel headings through chalk and green sand, under a head of water at Holywell, on the line of the Wilts and Somerset Railway.

The materials had been collected from the author's diary of the proceedings, and it had been his intention to give many more details as practical examples for the younger members of the profession, but with access to the excellent work on Tunnelling, by Mr. Simms, it was feared that the communication might be deemed too prolix.

It was intended that No. 1 tunnel should have been constructed in the usual manner by sinking shafts, and connecting them by a bottom heading running through between open cuttings at the north and south ends; there were, however, indications, from the borings, of the ground being unfavourable, the body of the tunnel being in chalk full of faults, whilst the cuttings at both ends were in green sand, and copious springs showed themselves along the line of operations, which were conducted through strata generally dislocated, and not to be depended on. In sinking the shafts, the water brought away with it such quantities of sand as to create cavities around and produce serious failures in the timbering, which required to be renewed and replaced several times. Numerous contrivances were essayed for overcoming the difficulties,—gullets were cut at lower levels, in hopes of their drawing off the water, but the tenacity of the soil and the numerous faults precluded any chance of their being useful; nothing but incessant pumping could therefore be relied upon; but the consequence of this was, that the framing of the shaft sunk bodily, until it was retained by a hanging kerb and rods from the surface; then, in spite of close sheathing planks, a lateral settlement occurred, and amidst a recurrence of these accidents the shaft was carried down until the sand and water rose so rapidly in the bottom, that it was necessary to close it by a timber platform, through which the water rose to a certain level, whence it was pumped. Similar difficulties were encountered in the other shafts, enhanced, in one case, by the frequent recurrence of boulders of sand-stone, which occasioned much loss of time and inconvenience in extracting them, and left large cavities behind the sheathing. The quantity of water also increased so much, that the briefest delay in pumping obliged the men to leave the headings.

At length, it being observed that the dip of the sand-rock, which was the water-bearing stratum, was in such a direction as to induce the inference that it might be used to convey the water away, by having it tapped at a lower level, the attempt was made, and was attended with success. In the subsequent extension of the open cuttings, the numerous vertical faults were shown to have been in a great degree the cause of the slips in the shafts.

In consequence of observations on the saturated strata, it was determined to try the effect of a syphon, which was accordingly laid down; it was formed of cast-iron pipes, 6 inches diameter, the short leg dipping into a hole at the bottom of one of the shafts, whilst the long leg extended through the crown heading, and terminated in a cistern in the north cutting. By means of a hand-pump at the upper bend, the air was exhausted, and the action was so perfect as to drain the blocks of sand and enable the headings to be completed.

Accounts were given of the numerous ingenious contrivances resorted to for overcoming difficulties, and also of the effects of the drainage upon the springs and wells in the neighbourhood. The various machines and devices employed were described in connection with all the tunnels; in fact, the paper was, as it professed to be, a detail of the casualties of tunnelling, under circumstances of considerable difficulty, and it was well illustrated by a series of diagrams, showing the works in all stages of their progress.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Dickson, James Hill, of Evelyn-street, Lower-road Deptford, Kent, flax-manufacturer and flax machinist. *Improvements in the process of preparing flax or similar fibrous material, and rendering it fit for spinning and weaving.* Patent dated November 11, 1853. (No. 2619.)

This invention is an improvement on a former patent, and is for the purpose of separating the fibrous substances, and for dissolving the gummy and resinous matter contained in them, by which the fibres are made finer, more silk-like, and better adapted for spinning and weaving, the same process being applicable to the preparation of cocoa-nut, aloe, plantain, and other East-Indian fibres; also in joining the plantain fibres, so that they may be woven without being spun.

Levien, Johan Martin, of Davies-

street, Grosvenor-square, Middlesex, upholsterer. *An improved construction of expanding-table.* (A communication.) Patent dated November 11, 1853. (No. 2621.)

In constructing expanding tables according to this invention, the parts which slide over each other and form the connection between the two end frames, are severally recessed on their opposite sides, and the inner or contact surfaces of the side pieces of the end frames are similarly recessed, and grooves are formed in these recesses to receive respectively the top and bottom edges of a metal guide-plate, which is mounted on a lock affixed to and projecting out from the recess of the adjacent side-piece.

Barker, Stephen, of Birmingham, Warwick, manufacturer. *An improvement or improvements in shaping metals.* Patent dated November 12, 1853. (No. 2622.)

This invention consists in manufacturing the ornamental metallic wire used for the edges of plated wares, &c., by means of a rolling process.

Délande, François Amand, of Paris, France, gentleman. *A new metallic composition.* Patent dated November 12, 1853. (No. 2623.)

This invention consists in certain processes for producing a new metallic alloy, similar to silver in appearance and intended to supersede it in various applications. Tin forms the base of the composition, and to prepare it the inventor calcines it two or three times with saltpetre, and reduces the calcined part to powder, which is melted down in a crucible. When in a fluid state it is purified by being mixed with charcoal powder, the clear part being drawn off into another crucible ready for use.

Kilshaw, Henry, of Birch, near Middleton, Lancashire, manager, and Richard Hacking, of Bury, machinist. *Improvements in machinery or apparatus to be employed in the preparation of cotton and other fibrous substances for spinning.* Patent dated November 12, 1853. (No. 2624.)

Claim.—A peculiar arrangement of gearing and training wheels to be employed for obtaining a taking in motion, and imparting a positive and retained "twist" to the sliver in combination with a rotative motion of the receiver.

Austin, William, of Holywell-street, Westminster. *Improvements in the manufacture of casks.* Patent dated November 12, 1853. (No. 2627.)

This invention consists in forming wooden casks, each with six equal sides, so that when on end several casks may be placed together without space between them.

De la Rue, Thomas, of Bunhill-row. *An improvement in the manufacture of paper.* Patent dated November 12, 1853. (No 2628.)

Claim.—The incorporation of oxide of zinc with pulp in the process of manufacturing paper.

Austin, William, of Holywell-street, Westminster. *Improvements in apparatus for trapping passages into sewers or drains.* Patent dated November 12, 1853. (No. 2629.)

In carrying out this invention a box or vessel is formed through which the passage into the sewer or drain passes in such manner as to leave a space below the upper part of the passage and the bottom of the vessel to receive and retain the heavier matters, sediment, and floating matters. Over the upper part of the passage is placed an inverted bell or vessel with a grating at the lower part, so as to prevent the passage into the sewer or drain with the water of all matters except such as can pass through the perforations of the grating; the box of the trap is also covered by a grating.

Hadfield, William, of Manchester, spinner and manufacturer. *Certain improvements in looms for weaving.* Patent dated November 14, 1853. (No. 2632.)

This invention relates to the letting off of the yarn from the warp-beam. In carrying it out apparatus is arranged in such manner that when the taking-up lever has given motion to a certain bar, one end of it is drawn beyond the reach of a gauge, and a click is at the same time brought against the teeth of a ratchet-wheel; but when the batten recedes from the cloth the taking-up lever is moved back, and the stud to which the said bar is hinged slides in the slot formed in the bar, which is then acted upon by a spring and drawn back until the end before-mentioned comes in contact with the gauge.

Willis, Henry, of Manchester-street, Middlesex, organ builder. *Improvements in the construction of organs and free-reed instruments.* Patent dated November 14, 1853. (No. 2634.)

Claims.—1. The application to pneumatic levers of a throttle valve, for governing the supply of air to the bellows. 2. Applying to the valve of the tremulant a movable stop capable of being actuated by the performer, for the purpose of increasing and diminishing the intensity of the pulsation of the tremulent while the organ is in action.

Gray, Matthew, of Glasgow, Lanark, North Britain, engineer. *Improvements in weft forks for power looms.* Patent dated November 14, 1853. (No. 2636.)

Claims.—1. "Constructing the weft forks or protectors of power looms wherein the front or pronged portion of such forks, is

in one solid piece, or has the whole of the prongs connected to each other, so as to maintain a suitable distance, having at the same time liberty to work independently of the back or plain lever portion." 2. The use of weft forks with solid prongs, or prongs connected to each other, and separate or detached back levers.

SMITH, WILLIAM, of Mauchline, Ayr, North Britain, gentleman. *Improvements in ruling ornamental figures.* Patent dated November 14, 1853. (No. 2639.)

Claims.—1. A mode of ruling ornamental figures, wherein a number of pens are actuated simultaneously or in concert, each pen producing a separate repeat or portion of a repeat of the pattern. 2. A mode of ruling ornamental figures, wherein the corresponding lines of each set of lines of the pattern are drawn simultaneously on two or more parts of the material operated upon, so as to produce corresponding repeats of the pattern. 3. A mode of adjusting the pens of ornamental ruling-machines laterally, by means of a lever capable of being set to an enlarged index or scale of the pattern.

BERGUE, CHARLES DE, of Dowgate-hill, London, engineer. *An improvement or improvements in machinery or apparatus for removing patterns from moulds for casting.* Patent dated November 14, 1853. (No. 2641.)

This invention consists in removing patterns from moulds by means of rods, bars, or slings applied at each of two or more separate points, such rods, bars, or slings being each guided so as to work in a direction perpendicular to the surface of the sand or other material used in the mould, and so as to effect the draw or separation of all parts of the pattern steadily and gradually.

CATTERSON, JOHN JOSIAS, of Islington, Middlesex, civil engineer. *Improvements in carriage-springs.* Patent dated November 15, 1853. (No. 2642.)

Claims. — 1. The combination of one double spring with two long single springs, placed side by side, one above the other, as described. 2. The combination of two double springs with four long single springs, arranged side by side in pairs, or with two of them arranged side by side, and the other two placed over the double springs.

BLANK, CHARLES EMILIUS, of Trump-street, London, merchant. *Improvements in winding yarn into hanks.* (A communication.) Patent dated November 15, 1853. (No. 2643.)

In carrying out this invention, the object of which is to facilitate spooling, the yarn is passed in such manner that it shall become crossed five or more times, the pegs being so placed on the frame that when the end of the yarn is attached on one (say the first peg), it will be made by the motion of a lever pushing forward or withdrawing the slide on which the leading wire is placed to cross to another or inner peg, thence to an outer peg, and so on, alternately, till the whole hank is made.

LIDDELL, JOHN, of Glasgow, Lanark, merchant. *An improvement or improvements in power-loom weaving.* Patent dated November 15, 1853. (No. 2644.)

Claims.—1. The employment of a ratchet-wheel and fall, or cam motion applied to the gearing of the common power-loom, for the purpose of giving motion to heddle-leaves. 2. The employment of shifting-catches for dropping and taking up flushing heddles at such intervals as are required to produce the particular pattern.

CAMERON, JOHN, and JAMES NAPIER, both of Loughor, Glamorgan, practical chemists. *Improvements in obtaining gold and silver from ores, alloys, or compounds containing such metals.* Patent dated November 15, 1853. (No. 2645.)

The inventors first fuse the ore in a reverberatory furnace, adding such fluxes as will make the slag quite fluid (two or three per cent. by weight of carbonate of soda or potash added greatly assists this operation); the slag is stirred well several times during fusion with an iron paddle, and then, after about half an hour, carefully removed by skimming or tapping. If the silver and gold ores have contained no other metal or sulphur, the silver and gold will be found under the slag.

THWAITES, JOHN HALL BROCK, of Bristol, dentist, and WILLIAM BIRD HERAPATH, also of Bristol, M.D. *Improvements in the manufacture of quinine and other alkaloids.* Patent dated Nov. 15, 1853. (No. 2646.)

This invention consists in first extracting the alkaloid from the bark or other substance containing it by means of dilute acid, then precipitating the alkaloid by an alkali, and afterwards separating the alkaloid from the water in which it is held in solution by means of fusil oil, camphine, turpentine, or other hydro-carbon that is insoluble in water.

FRY, JOSEPH, of Cannon-street West, London, merchant. *Improvements in preparing solvents for India-rubber and gutta percha, and in rendering waterproof fabrics free from odour.* Patent dated November 15, 1853. (No. 2648.)

This invention consists in dissolving India-rubber or gutta percha in solvents before distilling them, and in introducing those substances into the still when distilling or rectifying the solvents. And in order to deprive waterproof fabrics of the odour consequent on the use of solvents, the

fabrics are placed in a steam chest, and subjected to the action of free steam, the upper parts of the steam chest being coated with layers of flannel to prevent condensation.

HALKETT, PETER ALEXANDER, of the Albany, Middlesex, lieutenant Royal Navy. *Improvements in apparatus for lifting and lowering ships and other heavy bodies, either submerged or otherwise.* Patent dated November 16, 1853. (No. 2649.)

This invention consists in constructing a grasping belt of a series of warps or chain cables, with which a number of flexible air or waterproof bags or cases are interwoven transversely to the warps. The belt may be in one piece to encircle a ship, or for convenience may consist of several pieces, which can be united to form the length required for any given purpose.

HILL, PHILIP, of Gravel-house, Coggeshall, Essex. *Improvements in weaving plush and other piled fabrics.* (Partly a communication.) Patent dated November 16, 1853. (No. 2653.)

Claim.—The manufacture of plush and other fabrics (when two fabrics are woven face to face, and combined by the warp threads, which, when cut apart from the pile of the two fabrics) by employing two pile warp threads to each dent, and four pile lambs or shafts.

RONALD, JOHN, of Paisley, manufacturer. *Improvements in fixing colours on yarns and cloths.* Patent dated November 16, 1853. (No. 2654.)

These improvements consist in causing yarns to be treated in suitable chambers externally heated by steam or other heat.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in thrashing-machines, and in apparatus connected therewith.* (A communication.) Patent dated November 16, 1853. (No. 2655.)

In the machine described by this patentee the thrasher or beating cylinder is driven by suitable multiplying gear, which is actuated at once from the main horse drag lever, or from a driving pulley, if steam power be employed. Beneath the thrashing-drum is fitted a perforated plate to receive the thrashed straw and grain, the latter falling through on to an endless travelling apron, which conducts it into a channel leading to a suitable receptacle. Immediately beneath the grating and the thrashing drum is fitted a vibrating double wire frame for the reception of the grain and husks which fall through before reaching that part over the endless apron. From this double wire frame the grain falls into the same channel or conductor, and the husks, dust, &c., are carried off up a suitable ventilator by means of a revolving fan.

PRATT, DAVID, of Birmingham, Warwick. *Certain mechanical arrangements for raising thimbles, the same to be worked by steam, water, or other power, thereby superseding hand labour.* Patent dated November 16, 1853. (No. 2656.)

The title of this invention expresses what the inventor claims.

FERGUSON, JOHN, of Heathfield, Lanark, North Britain, brick and pottery manufacturer. *Improvements in furnaces and fire-places, and in the prevention of smoke.* Patent dated November 16, 1853. (No. 2657.)

Claims.—1. A mode of constructing furnaces or fire-places, wherein passages are formed for the introduction of air into the main flue or flues; such passages being carried along close to the main-flue passages, from which they are separated by very thin partitions, so that the air may take up the heat radiated from the main flues. 2. A mode of constructing furnaces or fire-places, wherein a hanging or intermediate bridge is combined with or inserted in a mixing or combination-chamber, for the commingling of the gaseous products of combustion and air. 3. A mode of constructing furnaces or fire-places, wherein the gaseous draught current takes a descending and ascending or tortuous route through a mixing or combination-chamber. 4. The use of brick or earthenware ducts or passages, for heating the air prior to entering the furnace or flue.

BRISTOW, JAMES, of Bouverie-street, London, miller, and HENRY ATWOOD, of Holland-street, Blackfriars-road, Surrey, engineer. *An improved mode of constructing marine boilers.* Patent dated November 16, 1853. (No. 2660.)

This invention consists in bringing the adjacent fire-places of marine boilers into communication with each other, for the purpose of turning the smoke which is generated in one fire-place after each successive supply of coals on to the bright fire in an adjoining fire-place, and thereby effecting the consumption of it. For this purpose the fire-places are connected together by means of lateral flues, which pass through the intervening water-space near the fire-doors, and by these a communication is at all times open between the several places of the group.

CARTER, GEORGE, of Mottingham, Kent, gentleman. *Improvements in the construction of steam-engine boiler, and other furnaces.* Patent dated November 17, 1853. (No. 2661.)

This invention consists mainly in a mode of adjusting the aperture or throat of the flue at the furnace-bridge, by means of a sliding damper, for increasing or diminishing the draught; by which arrangement,

together with a central deflecting bridge, tapering fire-bars, and certain modifications of the flues and ash-pits of furnaces, the inventor proposes to effect the consumption of the smoke generated.

CLARE, JOHN, jun., of Exchange-buildings, Liverpool, Lancaster, produce-broker. *Improvements in the manufacture of bar and sheet metals, in machinery connected therewith, and in the application of such metals to various useful purposes.* Patent dated November 17, 1853. (No. 2662.)

This invention relates—1. To the manufacture of various improved forms of angle-iron, applicable also to bars of other metal. 2. To the formation of peculiar flanges to sheet-metal. 3. To the application of such improved forms of bar and sheet-metals to the construction of ships and other vessels, and to various manufacturing purposes. 4. To the manufacture of stamping, pressing, or rolling-machinery to be employed in certain of the above processes.

DUGMORE, GEORGE, of Birmingham, Warwick, manufacturer, and GEORGE HAYWOOD MILLWARD, of Birmingham, aforesaid, manufacturer. *A new or improved method of signalling or communicating between trains on railways.* Patent dated November 17, 1853. (No. 2663.)

Claim.—Communicating between trains on railways by causing a current of electricity from one train, whether at rest or in motion, to circulate in rods laid along the line of railway, or through the ordinary rails, and actuate a signal on another train at rest or in motion.

ABRAHAM, SOLOMON, and SAMUEL VICTOR ABRAHAM, of Lisle-street. *Communicating information or directions to persons in charge of railway trains.* Patent dated November 17, 1853. (No. 2664.)

This invention consists in the application of electro-magnetism to certain arrangements of apparatus for actuating audible or visible railway signals.

ASHTON, WILLIAM, of Manchester, Lancaster, machinist. *Certain improvements in machinery or apparatus for manufacturing braid.* Patent dated November 17, 1853. (No. 2665.)

In carrying out this invention, the object of which is to give a uniform tension to the threads, two or more metal rollers are placed on each side of the framing of the machine, running in small bearings, and between these drawing-rollers and the framing is fixed a metal or other bar, having as many holes in it as there are threads required. The threads to be braided are brought from the bobbins placed on the upper edge of the framing, or any other convenient place, and led first through each or any of the said holes, and then over the upper surface of the drawing-rollers, from which they pass, as heretofore, through the eyelets or holes at the bottom of the machine, and then upwards through the spindle carriages.

BANFIELD, JOHN, of Birmingham, Warwick. *Double-acting railway signal for preventing collisions or accidents on railways.* Patent dated November 17, 1853. (No. 2666.)

This invention consists in arranging apparatus to be connected with signal posts, which apparatus is to be acted upon by a passing train, and thus communicate signals to a succeeding one.

BURTON, CHARLES, of New Oxford-street, Middlesex, carriage manufacturer. *Certain improvements in hand and draught carriages for common roads.* Patent dated November 17, 1853. (No. 2668.)

This invention consists in adapting the long levers and cross-bar fitted to the rear of children's hand-carriages, &c., according to a registration procured some time since by the patentee, to larger carriages.

BOURNE, THOMAS, of West Smithfield, Middlesex, saddler. *Improvements in the construction of buckles.* Patent dated November 17, 1853. (No. 2669.)

This invention consists in hinging one part of a buckle, and in fitting studs, holes, and spring catches to other parts.

COMPLETE SPECIFICATIONS FILED WITH APPLICATIONS.

KEMP, HENRY, of Creekmoor, Poole, Dorset, gentleman. *Certain improvements in the preparation of wood for planking and sheathing ships and other vessels; also in house, ship, and pier building, railway, sleepers, &c., and all other purposes whatsoever where wood is required.* Application dated April 8, 1854. (No. 828.)

This invention mainly consists in injecting solutions of prepared sulphate of barytes and of sulphate of copper into wood, and in puncturing the wood (previous to performing the injection) by a rolling process, for the purpose of admitting the solutions more effectually into it.

RIDGWAY, WILLIAM, of Hanley, Stafford, earthenware manufacturer. *Improvements in the construction of ovens and kilns.* Application dated April 15, 1854. (No. 870.)

This invention consists in the employment of a number of vertical conducting, diffusing, and radiating pipes, by the aid of which the flame and heated air proceeding from the oven mouths through the flues beneath it, are led into those parts of the oven where their action is required. By their being distributed through the various quarters of the oven no injurious effect is

produced by a large concentration of fire at one place.

EAST, FREDERICK, of Warminster, Wilts, assistant-master in the Warminster grammar-school. *Taking photographic views and portraits in the open air by means of vertible machinery attached to a cubical box, by which the changes are seen, and the light and the time of exposure regulated.* Application dated May 15, 1854. (No. 1086.)

This invention mainly consists in constructing a portable cubical box, and in fitting within it a photographic plate and a moveable chest, and everything that is required for taking, developing, fixing, washing, and drying from half a dozen to six dozen views or portraits in the open air.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

THOMPSON, THOMAS, of Much Park-street, Coventry, Warwick, engineer. *Improvements in machinery for weaving carpets, coach lace, and velvet.* Application dated October 19, 1853. (No. 2417.)

The primary feature of this invention consists in manufacturing two pieces of terry or Brussels carpet together in one loom, and in the time that is usually required for weaving one piece. The two pieces are formed one above the other by means of a double set of warps.

VERDUN, JEAN BAPTISTE, of Paris, France, gentleman. *Improvements in the construction of globes.* Application dated October 25, 1853. (No. 2457.)

This invention consists in forming globes of tubes and convex discs fitted with a handle which works a screw and thereby causes the discs and tube to assume a globular form. Terrestrial and celestial divisions, &c., are inscribed upon the globes in the usual manner.

EASTON, ABEL, of Barnard's-inn, Middlesex, gentleman. *An improved lamp.* Application dated November 11, 1853. (No. 2617.)

This invention consists in making a lamp for lighting, by means of jets of gas produced in the interior of a cap or chamber supplied with a spirit or liquid chemical compound, by the action of caloric on the outside of the said cap or chamber from the jets themselves, thus constituting a self-generating gas lamp.

EASTON, ABEL, of Barnard's-inn, Middlesex, gentleman. *A liquid chemical compound for the production of artificial light.* Application dated November 11, 1853. (No. 2618.)

For forming one gallon of his compound, the inventor mixes "1 ounce of spirits of wine, 15 minims of oil of lavender, 5 pints of best wood naphtha, 1 drop of neroli, 15 minims of burgomotte, 2 and 7-8ths of a pint of best coal tar naphtha, 4 minims of otto of roses, 1 drop of essential oil of bitter almonds, and 2 drops of oil of cloves."

GEDGE, JOHN, of Wellington-street, Strand, Middlesex. *Improvements in the means of consuming or otherwise preventing the escape of smoke from flues or other smoke-vents.* (A communication). Application dated November 12, 1853. (No. 2625.)

The inventor proposes to place sieves or lattices of wire (made by preference from a metallic compound described in the following abstract of provisional specification, No. 2626), in certain positions in the interior of the chimney or flues; the wire being capable of sustaining great heat and not easily corroded, is to catch the smoke in its upward progress.

GEDGE, JOHN, of Wellington-street, Strand, Middlesex. *Improvements in the manufacture of metallic compounds.* (A communication.) Application dated November 12, 1853. (No. 2626.)

The inventor proposes to mix copper, nickel, borax, and saltpetre, melting the whole in the usual manner; he adds tin and zinc to the melted mass, and then covers the crucible or melting pot with animal charcoal and alum previously mixed. When the whole is perfectly amalgamated, he pours it into ingot moulds.

BUSSON, CONSTANT, manufacturer, of Paris. *Certain improvements in finger-keyed musical instruments.* (A communication.) Application dated November 12, 1853. (No. 2630.)

This invention consists of an improved portable musical instrument of that class of finger-keyed instruments in which the sound is produced by the vibration of metal tongues acted upon by currents of air. It is furnished both with bellows and a wind chest, from which the air to act on the tongues, which are arranged in two parallel boards, is drawn.

HILL, JOHN SINGLETON COPLEY, of Birmingham, Warwick, gentleman, and EDWIN COTTRILL, of Birmingham, aforesaid, manufacturer. *An improvement or improvements in stamps and presses, a part or parts of which improvements may be applied to other purposes.* Application dated November 14, 1853. (No. 2631.)

This invention consists in applying to embossing and other presses a machine for the purpose of registering the number of impressions taken by it; and also in applying thereto mechanism for preventing the taking off impressions fraudulently from the machine.

COTTAM, SAMUEL FLETCHER, of Man-

chester, Lancaster, engineer. *Improvements in machinery for spinning, doubling, and reeling cotton and other fibrous substances.* Application dated November 14, 1853. (No. 2633.)

These improvements mainly consist in a new combination of parts for producing the winding on motion of self-acting mules. To the carriage square is attached the fulcrum stud of a radial arm, and to the framing of the headstock is attached the fulcrum of a vibrating lever, to which the outer end of the radial arm is jointed. When the carriage is out the vibrating lever and radial arm are vertical or nearly so; but when it is in, the vibrating lever is inclined, and the radial arm is nearly horizontal. The winding-on chain, being attached in the usual manner to a nut on the screw of the radial arm, is let off more or less as required, according to the position of the nut and the varying angles produced in the radial arm when the carriage is going on.

Cunninghame, Alexander, of Glasgow, Lanark, North Britain, iron-master. *Improvements in the manufacture or production of sulphuric acid.* Application dated November 14, 1853. (No. 2635.)

This invention consists in producing sulphuric acid economically by means of sulphur derived from alum schist, alum slate, the substance technically known as black stone, any of those substances containing sulphur which are found in the coal measures, and from the sulphates of barytes and strontian.

Coubrough, Anthony Park, of Blanefield, Stirling, North Britain, calico-printer. *Improvements in bleaching apparatus.* Application dated November 14, 1853. (No. 2637.)

This invention consists in so arranging a vertical pipe placed in the top of the boiling-pot, and other apparatus, that the waste frequently occasioned by the boiling over of the bleaching liquor may be prevented.

Anderson, William, junior, and Alexander Wark Murphy, of Glasgow, Lanark, North Britain, manufacturers. *Improvements in that class of ornamental fabrics usually termed "Ayrshire sewed work."* Application dated November 14, 1853. (No. 2638.)

According to this invention a black or coloured muslin is employed as the ground fabric, and stitched embroidery, either of black or coloured material alone, or black and white, or other intermediate colour and white combined, is laid upon its surface. These combinations produce new mourning fabrics.

Fitzgerald, Michael, of Sorrel Island, Clare, esquire. *An improved means or method of communicating between different parts of a railway train.* Application dated November 14, 1853. (No. 2640.)

This invention consists in employing air-tight and other tubes attached to the carriages of a railway-train for the purpose of whistling or speaking through.

Delcambre, Adrien, of Paris. *Improvements in machinery for distributing type.* Application dated November 15, 1853. (No. 2647.)

The inventor places a page or column of type in a galley similar to that now used in printing offices, but provided with an arrangement by which lines may be collected into one long line for more convenient distribution. This long line of type is collected into a reservoir which the workman slides by hand, liberating the letters when they are opposite their several compartments.

Ellerthorpe, John, of Kingston-on-Hull, York, master mariner. *Retarding and stopping railway trains and railway carriages.* Application dated November 16, 1853. (No. 2650.)

By the application of a lever or other suitable contrivance at the disposal of a guard or other attendant, the inventor proposes to throw into gear a connection by which the motion of one or more axles of the train may cause breaks to be applied to several wheels of the train.

Wayte, James Wills, of Gate-street, Lincoln's-inn-fields, Middlesex, engineer. *Certain improvements in self-feeding furnaces.* Application dated November 16, 1853. (No. 2651.)

This invention relates to that description of furnaces in which the bars receive a reciprocating longitudinal motion, by which the fuel is gradually propelled from the front to the back of the furnace. The present inventor proposes to produce this motion by cranks, eccentrics, a rocking-shaft, or a lever, and at the same time to give an up-and-down motion to the front end of the bars, by means of a rocking-lever with two arms.

Musgrave, John Riddel, Robert Musgrave, and James Musgrave, of Belfast, Ireland. *Improvements in hot-air stoves.* Application dated November 16, 1853. (No. 2652.)

This invention relates to slow combination stoves used for heating apartments, &c., and consists mainly of improvements in the internal arrangement of the stove, the object being to maintain a uniform temperature during any length of time, while the furnace will not require feeding oftener than once in sixty hours.

Greenfield, William Frederick, of Ipswich, Suffolk, clerk, M.A. *Improvements in communicating signals from one part*

of a railway train to another. Application dated November 16, 1853. (No. 2658.)

A full description of this invention was given in page 268 of the current volume.

JACKSON, THOMAS, of Commercial-road, Pimlico, Middlesex, contractor for public works. *Improvements in the manufacture of hats.* Application dated November 16, 1853. (No. 2659.)

These improvements consist in applying the fabric or material of which the "nap" or "pile" is composed so that instead of inclining around the body of the hat, it may incline vertically, or nearly so; that is, from the crown towards the rim.

UNDERWOOD, WILLIAM, of Handsworth, Staffordshire. *Improvements in cooking-stoves.* Application dated November 17, 1853. (No. 2667.)

This invention consists in arranging within an iron case an open or close grate for the burning of coals, wood, &c., with the flues so constructed as to convey the heat first to an oven placed above the fire, and next to a boiler for water placed at the back of the oven, beyond which is the chimney.

PROVISIONAL PROTECTIONS.

Dated March 1, 1854.

500. Simon Roussel, of Rue Caumartin, Paris, France, gentleman. A new system of painting and colouring glass, being an imitation of old and new church window-glasses, called "Typophanic."

Dated March 8, 1854.

554. Louis Jean Barnetche, of Bordeaux, France, doctor of medicine. Improvements applicable to the prevention of accidents on railways.

Dated March 9, 1854.

562. James Smith, of Liverpool, Lancaster, biscuit baker. Improvements in baking-ovens.

Dated March 17, 1854.

638. Thornton John Herapath, of Bristol, analytical chemist. Improvements in the manufacture of manure from sewage, which are also applicable to the preparation of other artificial manures.

Dated March 27, 1854.

710. George Collier, of Halifax, York, mechanic. Improvements in looms for weaving terry and cut pile fabrics.

Dated April 8, 1854.

827. John Platt, of Oldham, Lancaster, machine-maker. Certain improvements in machinery for preparing cotton.

Dated April 11, 1854.

850. Thomas Schofield Whitworth, of Salford, Lancaster, mechanic. Improvements in the mule for spinning and doubling cotton and other fibrous materials.

Dated April 18, 1854.

892. John Rowley, of Camberwell, Surrey. Improvements in the manufacture of a material as a substitute for leather.

Dated May 2, 1854.

986. Robert James Maryon, of York-road, Lambeth, Surrey, gentleman. Certain improvements in the construction of and manufacture of anchors.

Dated May 4, 1854.

998. Cornelia Mee, of Bath, Somerset. An improved foundation for working out ornamental designs or patterns.

1000. Charles Barlow, of Chancery-lane. Improvements in meters for accurately measuring water and other fluids discharged from pipes, sluices, or vessels. A communication from Joseph R. Taylor, of New York.

1002. John Manley, of Chacewater, Cornwall, mine agent. An improvement in ventilation, and in treating smoke so as to prevent the ascent of the denser particles thereof into the atmosphere.

Dated May 5, 1854.

1004. William Exall, of Reading, Berks, civil engineer. Improvements in machines for cutting straw, and other such materials.

1006. Edwin Haseler, of Wolverhampton, Stafford, japanner. An improvement or improvements in ornamenting metals, papier maché, horn, and shell.

1008. Antoine Marie Philibert Barbette, of Paris, France, brass founder. Improvements in the manufacture of brass-topped nails.

1010. Arthur Warner, of New Broad-street, London. Improvements in the manufacture of metal sheets for sheathing ships and other vessels, and for other uses.

Dated May 6, 1854.

1022. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in the construction of railway carriages. A communication from Antoine François Julian Doebs, of Toulouse, France, brewer.

1024. Julian Bernard, of Club-chambers, Regent-street, Middlesex, gentleman. Improvements in machinery or apparatus for sewing, stitching, or ornamenting.

Dated May 8, 1854.

1028. George Fox Logan, of Glasgow, Lanark, North Britain, boiler maker. Improvements in templates, to be used in constructing iron ships, boats, boilers, and other metallic structures.

Dated May 9, 1854.

1034. Francis Peter Berques, of Richmond-road, Dalston, Middlesex, gas-engineer. Improvements in cooking and heating-stoves, and in generating heat therefore.

1036. Charles Liddell, of Abingdon-street, Westminster, esquire. Improvements in the permanent way of railways.

1038. Eben Norton Horsford, of Massachusetts, United States of America. The removal of chlorine from substances and fabrics.

Dated May 10, 1854.

1040. Pehr Ambjorn Sparre, of Salisbury-street, Strand, Middlesex, engineer. An improved mode of preventing the alteration or falsification of written documents.

1042. Rees Reece, of Athy, chemist. The smelting of iron by means of turf or peat simultaneously with the combustion of the peat and collection of the products therefrom.

1044. John Anthony and William Treeby Chafe, both of Devonport, Devon, engineers. An improvement in machinery for the manufacture of pipes and tubes from lead and other soft metals and alloys.

Dated May 11, 1854.

1048. Edward Brown, manufacturer, Sheffield,

York. Improvements in the manufacture of scissors from steel and other metals.

1050. John Cundy, of Carrington, Nottingham, mechanic, one of a company called the Improved Reflecting Light Company. An improved reflector globe or shade for gas, candle, oil, and other artificial light.

1052. Henry Doulton, of High-street, Lambeth. Improvements in kilns used in the manufacture of stoneware, earthenware, and china.

1054. Edward William Abbott, of Regent's Quadrant, Middlesex, laceman. Certain improvements applicable to the manufacture of umbrellas and parasols, and cases for containing the same.

Dated May 13, 1854.

1072. Eugene Barsanti, professor of physics and mathematics in the Institut Ximeniano, and Felix Matteucci, gentleman, of Florence, Tuscany. A new or improved mode of applying the explosion of gases as a motive power.

1074. Charles Garforth, of Dukinfield, Chester, engineer. Certain improvements in apparatus to be employed in the construction of the permanent way of railways.

1076. Thomas George Shaw, of Old Broad-street, London, merchant. Improvements in apparatus to facilitate the decanting of wine and other liquids.

1078. Henry Young Darracott Scott, of Queen's-terrace, Woolwich, Kent, captain in the royal engineers. An improved cement applicable as a plaster, or for moulding purposes.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

1153. John Cox, of Birmingham, Warwick, percussion-cap manufacturer. Improvements in the manufacture of percussion-caps. 23rd May, 1854.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May 26th,* 1854.)

2981. Joseph Shaw. Improvements in pianofortes. A communication.

2989. George Goutaret. A new system of propulsion.

(*From the "London Gazette," May 30th,* 1854.)

3023. William Pickstone and John Booth. Improvements in looms for weaving.

3034. Weston Tuxford. Improvements in portable thrashing machines, part of which improvements is also applicable to fixed thrashing machines.

3038. James Slater. Certain improvements in cocks, taps, or valves.

131. Heloise Guyon. Improvements in the manufacture of bread.

136. Henry Dircks. Improvements in safety apparatus applicable to certain boilers and stills.

144. Richard Roberts. Certain improvements in machinery for cutting paper, paste-board, leather, cloth, and other materials.

148. George Grace and Thomas Francis Jones. Improvements in boots and shoes, as also boot and shoe socks, or inner soles, whereby the same are rendered waterproof.

153. Peter Spence. Improvements in manufacturing the prussiates of potash and soda.

174. Adderley Willcocks Sleigh. Creating a continuing self-acting, self-sustaining new motive power, applicable to every purpose requiring speed, motion, and power, together or separately.

190. Archibald Lockhart Reid. Improvements in printing textile fabrics and other surfaces.

202. Alphonse Cajetan de Simencourt. Improvements in composing and distributing type.

223. William Hodgson. Improvements in machinery for the manufacture of looped fabrics.

238. Louis Christian Koeffler. Certain improvements in machinery or apparatus for preparing, dressing, and finishing yarns or threads.

239. Louis Christian Koeffler. Certain improvements in the method or process of scouring, washing, and oiling wool and other textile materials for the purpose of spinning, and in the machinery or apparatus connected therewith.

240. William Wright and George Brown. Improvements in cupolas, which improvements are also applicable to smelting and other furnaces.

277. George Mills. Improvements in the construction of steam-vessels and in steering the same.

286. Robert James Maryon. Certain improvements in the machinery for the improved construction of windlasses and other machines, for which the same invention is applicable.

289. James Balie Graham. Improvements in the production of printing surfaces.

300. Alphonse François Damiens Duvillier. A new system of remontoirs or apparatus for winding watches without a key.

316. Eugène Boileau. Improvements in producing raised printing surfaces.

454. Thomas Forsyth. Improvements in furnaces.

456. Auguste Edouard Loradoux Bellford. Improvements in turn-tables for railways. A communication.

576. Peter Armand Lecomte de Fontainemoreau. Improvements in the manufacture of candles. A communication.

638. Thornton John Herapath. Improvements in the manufacture of manure from sewage, which are also applicable to the preparation of other artificial manures.

710. George Collier. Improvements in looms for weaving terry and cut pile fabrics.

734. William Simpson. Improvements in apparatus for communicating alarm signals on railways.

805. Alfred Tylor. Improvements in moderator lamps. A communication.

819. William Rigby. Certain improvements in machinery or apparatus for engraving metallic cylinders or rollers, employed for printing calico and other surfaces.

827. John Platt. Certain improvements in machinery for preparing cotton.

852. John Miller, the younger, and Michael Burke. Improvements in machinery for transmitting motive power.

877. Frederic Barnett. Illuminated furniture, &c., for interior and exterior decoration.

906. Thomas Vickers. Improvements in the manufacture of manure.

939. William Edward Newton. The application of a new or improved material or substance to the construction of certain parts of machinery. A communication.

943. Richard Ford Sturges. An improvement or improvements in joining metals.

954. William Gravatt. An improvement in propelling ships and other vessels.

974. Walter Macfarlane. Improvements in water-closets, lavatories, dust-bins, and public and domestic conveniences.

975. James Fenton. Improvements in safety-valves.

982. Alfred Trueman. Improvements in the manufacture of sulphuric acid, when roasting copper ores, and also when burning sulphur or iron pyrites.

992. John Henry Johnson. Improvements in

lathes for turning wood and other materials. A communication from Albin Warth, of New York, America.

993. William Westley Richards. An improvement or improvements in loading certain kinds of fire-arms.

1015. Josiah George Jennings. Improvements in the manufacture of earthenware pipes for drains and sewers.

1017. Josiah George Jennings. Improvements in apparatus for regulating and supplying water for water-closets and other purposes.

1022. John Henry Johnson. Improvements in the construction of railway carriages. A communication from Antoine François Julien Doebs, of Toulouse, France, brewer.

1034. Francis Peter Berquez. Improvements in gas-cooking and heating stoves, and in generating heat therefore.

1037. Alfred Vincent Newton. Improvements in the manufacture of artificial stone for building and other purposes. A communication.

1038. Eben Norton Horsford. The removal of chlorine from substances and fabrics.

1044. John Anthony and William Treeby Chafe. An improvement in machinery for the manufacture of pipes and tubes from lead and other soft metals and alloys.

1054. Edward William Abbott. Certain improvements applicable to the manufacture of umbrellas and parasols and cases for containing the same.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

NOTICE OF APPLICATION FOR PROLONGATION OF PATENT.

A petition will be presented to Her Majesty in Council by William Henry Fox Talbot, of Lacock Abbey, in the county of Wilts, esquire, praying Her Majesty to grant a prolongation of the Letters Patent granted to the said William Henry Fox Talbot on the 8th February, 1841, for "Improvements in obtaining pictures or representations of objects." On the 5th July (or on the next day of sitting of the Judicial Committee of Her Majesty's Privy Council, if it do not sit on the day mentioned), an application will be made to that committee to fix an early day for the hearing of the matters contained in the said petition; and any person desirous of being heard in opposition, must enter a caveat to that effect in the Privy Council-office on or before that date.

WEEKLY LIST OF PATENTS.

Sealed May 25, 1854.

2748. John Henry Johnson.

Sealed May 26, 1854.

2755. Joseph Wormald and George Pollard.
2762. Louis Cornides.
2769. Robert Hawkins Nicholls.
2772. Alexander Macomie.
2775. Patrick Kelly.
2778. Auguste Edouard Loradoux Bellford.
2784. Edward Keating Davis.
2793. Thomas Garnett and Daniel Adamson.
2799. John Henry Johnson.
2820. Squier Cheavin.
2828. Edward Oldfield.
2876. Allan Macpherson.
2879. Hippolyte Laurent Du Bost.
2885. Edward Orange Wildman Whitehouse.
2888. William Redgrave.
2898. Edward Beanes.
2912. Jean Baptiste Pascal.
2934. Andrew Lawson Knox.
2968. Heiman Kohnstamm.
2977. Charles Lewis.

1854:

9. Joseph Madeley.
83. Auguste Edouard Loradoux Bellford.
167. John Westlake.
220. Peter Armand Lecomte de Fontainemoreau.
397. William Henry Barlow.
428. Edward Massey.
457. Auguste Edouard Loradoux Bellford.
702. Thomas Smith and Joseph Smith.
709. James Alexander Manning.
752. John Henry Johnson.

Sealed May 30, 1854.

2532. Thomas Sanders Bale and Daniel Lucas.
2652. John Riddell Musgrave, Robert Musgrave, and James Musgrave
2781. Joshua Jackson.
2785. John Hewitt.
2787. Richard Balderstone.
2790. Lewis Jennings.
2816. William Dray.
2872. John Bourne.
2873. John Bourne.
2874. John Bourne.
2889. George Kerr Hannay.

1854.

36. Alfred Vincent Newton.
111. Henry Corlett.
123. Robert Galloway.
126. George Henry Bursill.
219. Peter Armand Lecomte de Fontainemoreau.
387. Ellis Rowland and James Rowland.
431. James Boydell.
631. Frederick William Emerson.
663. James Young.
679. William Dinsley Skelton.
680. Robert Owen White.
689. Stephen Holman.
729. Elmer Townsend.
756. George Fergusson Wilson and William Walls.
828. Henry Kemp.
870. William Ridgway.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Proprietor's Names.	Addresses.	Subject of Design.
May 10	3591	C. Weintrand	Cheapside	Cigar-case fastener.
12	3592	G. L. Williams	New Bond-street	Travelling-bag.
15	3593	G. J. Calvert	York	Kitchen-range.
22	3594	T. Trotman	Camden-town	Scrool-guard.
25	3595	Foster, Porter and Co.	Wood-street	Glove.
26	3596	T. Trotman	Camden-town	Carriage.
June 1	3597	Hill and Sandland	Birmingham	Cotton-reel brooch.

LIST OF PROVISIONAL REGISTRATIONS.

May 8	580	F. Peick & D. Seligson.	St. George's East	Umbrella-ribs.
11	581	S. P. Keene	Furnival's-inn	Purse.
17	582	J. Sherrard	Lambeth	Train-arrester.
,,	583	J. Sherrard	Lambeth	Pocket-protector.

NOTICES TO CORRESPONDENTS.

Enquirer.—Hero's Æolipile, invented nearly a century and a-half before the Christian era, was essentially a steam engine, and communicated rotary motion to a sphere; and there is great reason for believing that Blasco de Garay propelled a ship of 200 tons burden by steam power in 1543. The Marquis of Worcester, prior to 1663, employed steam as a motive power for raising water, and Savery's, Smeaton's, and other engines were in operation before Watt commenced his improvements.

J. D. P.—There are several centrifugal drainers, one of which was, we believe, patented by Mr. Seyrig, January 25, 1845.

D.—A simple method of forming an oblique cone consists in fixing upon a point (in the material of which it is to be formed) as a vertex, and upon a surface as a base, inscribing upon the latter the form of the base, and in then reducing the material until every point in the base may be joined, by a straight line, to the vertex.

E. Cocks.—Yours is received with thanks.

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URWIN'S PATENT STEAM ENGINE IMPROVEMENTS.

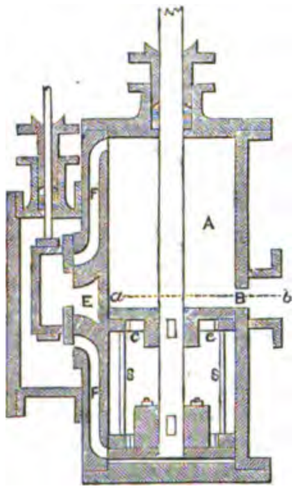


FIG.1.

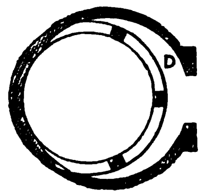


FIG.2.

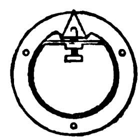
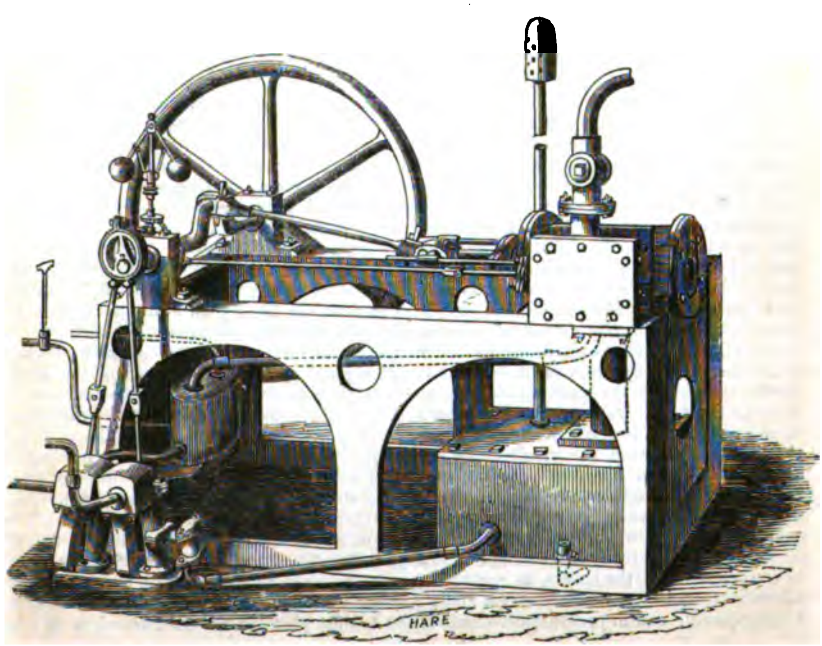


FIG.3.



URWIN'S PATENT STEAM ENGINE IMPROVEMENTS.

We have already given lengthy descriptions of several important improvements in steam engines, effected and patented by Mr. Urwin, of Stepney. (See Nos. 1353 and 1354.) The engine we are now about to bring before our readers embraces several additional improvements, which have been subsequently made by the inventor, and which, from their novel and curious character, are exciting a good deal of attention among engineers. With his present arrangement the inventor has in view four principal objects, which are undoubtedly of immense practical importance. They are as follows:—First. Putting the same steam and water-back again into the boiler, not reduced below the boiling point, without the aid of the extra machinery. Second. Producing a vacuum behind the piston, at both strokes, without the ordinary sized air-pump. Third. Having the advantage of working high-pressure steam. Fourth. Having also the advantage of possessing always a clean boiler, in which no deposit of silt, &c., can take place, so that the rapid wear of tubes and boiler surface, arising from the employment of impure or salt water, is obviated. A necessary consequence of the first of these would be that but little if any additional water would be required to keep up the supply to the boiler after it was once sufficiently fed, and the quantity of the fuel required by the furnace would, of course, be comparatively small. We have seen the small engine represented in the perspective engraving on the preceding page, which is constructed by Mr. Urwin, according to his improvements, running, when unloaded, at exceedingly high velocities; thereby proving that notwithstanding the seeming incongruity of his arrangements with the laws which are generally believed to govern the action and condensation of steam, there is much in the present invention which deserves the careful scrutiny of experimental engineers. Undoubtedly the main principle of the invention is an excellent one; viz., that of securing a considerable portion of the steam, that fills the cylinder at each stroke, before the passage is opened to the cold-water condenser, in order to return it as water to the boiler at a temperature far above 100°, which is that of the ordinary feed-water of condensing engines.

The results already obtained by Mr. Urwin are exceedingly promising, and are calculated to awaken serious inquiry into his methods. The following is the inventor's own description of his improved engine:

"The improvements introduced into this engine consist of a method of effecting the clearance or exhausting, whereby I am enabled to combine in one engine the advantages peculiar to both the condensing and high-pressure engines, and by which I obtain from given quantities of steam, within a given time, a greater amount of work or duty than has ever been before obtained, and this without the ordinary sized air-pump. Figs. 1 to 3, both inclusive, show the manner in which this improved method of clearance or exhausting is applied to an engine suitable for land or marine purposes. Fig. 1 is a vertical section of the cylinder and piston and their immediate appendages. A is the cylinder, which is longer in proportion to the length of stroke than usual, and instead of being entire in the sides from top to bottom, as usual, is made with an opening, B, in the middle, all round, with the exception of four connecting-pieces or ribs (see fig. 2 plan at *a*, *b*). C C is the piston; the constructive details are clearly shown in the sectional plan of it in fig. 3. It shows a metallic ring with a spring and wedge, no way differing from common packing-rings, the piston having one at each end, with a plain surface-piece covering the wedge inside, fastened to the packing-ring at one end, the packing-rings having three stays, *s*, *s*, *s* (see fig. 1), from one to the other, to keep them apart, according to the depth of the piston. It is made of such a depth, in proportion to the length of the cylinder, that when the piston has reached the end of its stroke in either direction, the top or underpart of it, as the case may be, shall just have passed clear of the middle opening, B, the entire opening is thrown open to the steam, so as to allow the steam, which was previously behind the piston, to escape through the middle opening, B, all at once, and in one mass, and without the least delay or obstruction, into the jacket, D, or casing which surrounds the middle opening, B (fig. 2), and allowed to pass into a vessel in connection with the jacket, D, partly filled with water in connection with the feed-pump, alternatively putting the same steam and water back into the boiler, not reduced below the boiling-point; and to prevent any compression taking place in the said vessel, it is pro-

vided with a small pipe connected with the said vessel, exposed to the atmosphere at the top, as shown in the perspective view; and as the piston makes its return stroke, it will stop the communication between the jacket, D, or casing, and the other side of the piston, (fig. 1.) F F, are two ports, one at the top and the other at the bottom of the cylinder, which serve alternately as inflows and outflows for the steam to and from the cylinder, in the same way as in ordinary steam engines. E is the exhaust-passage, which leads to a small condenser, H, shown in the perspective view, which differs in no respect from ordinary engines, so that any small portion of the steam that may be left in the cylinder after the piston closes the port, B, the slide will open the communication to the exhaust-passage, E, and it may be drawn off to the small condenser, H, and then condensed, and the vacuum rendered as perfect as is practicable, and so the reciprocating action of the piston kept up as long as steam is applied to the cylinder."

He adds, "Where water is an object, this engine is a desideratum, not requiring any for the boiler, excepting the waste that may escape through the glands; and by having a cistern for the holding of water to serve as the injection, it can be passed to and from the condenser to the cistern alternately, without any particular amount of evil to the vacuum, by its becoming heated. Much more might be stated with regard to the great improvements here shown as to expansion and high velocities, and saving of fuel."

ON THE PRODUCTION OF WAXED PAPER NEGATIVES.*

BY JAMES HOW.

ALMOST every one interesting himself as an amateur in the delightful art of photography, complains of the want of simple and practical directions in the works published for his guidance.

The complaint is not more universal than just. The books published are generally defective in the clearness of detail so essential to their utility. I have often found the most precise observance of the directions given fail to give the intended result; so many different methods are jumbled together, the reader being left to choose the best for himself; the consequence is, that many become discouraged at the outset, not having the opportunity of taking practical instructions, nor time nor inclination to wade through such a sea of experiments, before arriving at results sufficiently satisfactory to reward them for their pains, and to stimulate them to further application. It is in consequence of the above complaint having been so frequently made to me, and some of my friends wishing me to endeavour to remove its cause, that I have taken the opportunity which this valuable Society affords of laying before the lovers of this fascinating art, a few practical hints, which, while of the greatest possible simplicity, will, I hope, add some important facts to our present stock of photographic knowledge.

In the present paper, I propose to confine myself to the waxed paper process; which, although not *at present* in general use, will, I feel confident, eventually, when brought to perfection, and properly appreciated, be universally used for views, while collodion will be as universally employed for portraits. Of the latter, I shall not upon the present occasion speak, but hope at some future time to lay before you the results of some very interesting experiments, which I think promise great things upon this head.

I hold this opinion of the great value of the waxed paper process for the two following reasons:—First, it is obvious, that the thinner the paper used for negatives, the sharper the picture will be in the positive when printed from. In the talbotype process very thin paper cannot be used, since it would be too weak to allow the many and frequent washings necessary; but this process of waxing imparts a horny character to the paper, making the thinnest very strong, without increasing its thickness; it may then be washed, soaked, and re-washed for even several days if required, without the slightest fear of injury. And secondly, the paper so prepared can be kept after it is made sensitive and ready for the camera, without deterioration for from ten to fourteen days; while that prepared by the talbotype process can only be kept for about as many hours. This property in a climate so varying as ours must be of infinite importance, when considered in point of convenience as well as of economy. One great objection which has been urged against the use of waxed paper up to the present time, has been the fact of its requiring so long an exposure in the camera. After repeated experiments, I have found that when treated in the way I shall presently describe, this objection is entirely removed. Twenty minutes and even half an hour have generally been required for obtaining the impressions, but I have lately succeeded with a 3-inch Voigtlander lens of 16-inch focus,

* Read before the Chemical Discussion Society, May 11th, 1854, and reported in "The Chemist."

in obtaining first-rate negatives with perfectly black skies, which require no painting out, and the whites quite clear, the half tones also quite perfect, with five minutes exposure in the camera. It therefore appears to me quite certain that no process will be able to obtain precedence of this, which holds out such claims to superiority, from the beauty and sharpness of its pictures, the very valuable non-deteriorating quality of the excited paper; considered in connexion with the fact of so short a time comparatively of exposure in the camera, being required to complete the impression.

I have already had the honour of reading a paper before this Society on the preparation of the waxed paper, and must refer for a report of it to Notes and Queries for January 22nd, 1853; but as I have since then made several important modifications in my process, I must beg to recapitulate some of my previous details.

The wax generally sold as white wax in small round cakes, should not be used, as it is found to contain a large proportion of stearine and tallow, both of which are injurious in the preparation of the paper, but pure wax, to be had only in blocks, which is really pure, and not white, but a brownish yellow, an article well known in the drug trade. To wax the paper, I directed to take an iron (I prefer a box iron) moderately hot, in the one hand, and to pass it over the paper from side to side, following closely after it with a piece of white wax, held in the other hand, until the whole surface has been covered. By thus heating the paper, it readily imbibes the wax, and becomes rapidly saturated with it. The first sheet being finished, I place two more sheets of plain paper upon it, and repeat the operation upon the upper one (the intermediate piece serving to absorb any excess of wax that may remain), and so on, sheet after sheet, until the number required is waxed.

The sheets, which now form a compact mass, are separated by passing the iron, moderately heated, over them, then placed between folds of bibulous paper, and submitted to a further application of heat by the means just described, so as to remove all the superfluous wax from the surface, and render them perfectly transparent—most essential points to be attended to in order to obtain fine negative proofs.

I will now endeavour to describe the method of preparing the iodising solution.

Instead of being at the trouble of boiling rice, preparing isinglass, adding sugar of milk, and the whites of eggs, &c., I simply take some milk quite fresh (say that milked the same day), and add to it, drop by drop, glacial acetic acid, in about the proportion of one, or one and a half drachm, fluid measure to the quart, which will separate the caseïne, keeping the mixture well stirred with a glass rod all the time; I then boil it in a porcelain vessel, to throw down the remaining caseïne not previously coagulated, and also to drive off as much as possible of the superfluous acid it may contain. Of course any other acid would precipitate the caseïne; still I give the preference to the acetic from the fact that it does not affect the after process of rendering the paper sensitive, that acid entering into the composition of the sensitive solution.

After boiling for five or ten minutes, the liquid should be allowed to cool, and then be strained through a hair sieve or a piece of muslin, to collect the caseïne: when quite cold, the chemicals are to be added.

I would, however, make a remark before proceeding further, that some difficulty is sometimes found in making this iodising solution from the milk, in consequence of its not filtering perfectly clear, which I believe is owing to the difference of quality found in London milk; however, this difficulty may be removed by adding to the strained liquid, as soon as the caseïne is separated, the whites of two or three eggs to the quart; again boil, and on cooling the liquid will be perfectly clear.

The proportions of chemicals I now use are as follows:—

385	grs. iodide potassium.
60	grs. bromide „
30	grs. cyanide „
20	grs. fluoride „
10	grs. chloride of sodium in crystals.
1¼	grs. iodine.
2	oz. alcohol sp. gr. 836.

The above are dissolved in thirty-three fluid ounces of the strained liquid, and after filtration through white bibulous paper, should be perfectly clear, and of a bright lemon colour.

The iodising solution is now ready for use, and must be preserved in well stoppered bottles, when it will keep for any length of time.

The waxed paper is laid, sheet by sheet, in the solution, in a flat porcelain or gutta percha dish, and allowed to remain there for the space of from half an hour to an hour, according to the thickness of the paper. Several sheets may be immersed at once—say a dozen or eighteen; the whole should then be turned over, so that the first sheet immersed may be the first taken out and hung up to dry; thus far the whole may be carried on by day-light. A small piece of bibulous paper, about one or two inches square, should be attached to the lower corner to facilitate the drying. The paper in this state may be kept for any length of

time without injury, if preserved from the action of the air in a portfolio.

To excite the paper, or render it sensitive, take:—

Crystallised nitrate silver, 35 grs.
Acetic acid* (glacial), 40 min.
Alcohol, sp. gr. 836, 1 dr.
Distilled water, 1 oz. Mix.

As soon as dissolved, put this solution of aceto-nitrate of silver into a glass or porcelain dish (glass should be preferred), then take up one of the sheets of iodised paper by the two ends, and bend it into the shape of a horse shoe, gently drop the centre on the surface of the solution, and gradually lower both ends. By this means all air-bubbles will be excluded; if any should, however, remain, they will be seen through the transparent paper, and may be easily expelled by passing the finger-nail, or any convenient instrument, over them, after having carefully raised up the corner of the paper nearest to the bubble.

The dish should now be gently tilted, to allow the greater portion of the liquid to run to one side, and by means of a pair of horn tongs, the edge of the paper nearest to the deep fluid should be pushed under it; by treating each edge in this way as quickly as possible, and having got all the edges under, then, by gently shaking the whole, the entire surface will become immersed, and by constantly agitating the dish containing the solution and the paper, a very nice even coating may be obtained. This method is found far preferable to merely laying the sheet upon the surface, since it is made sensitive in much less time. The paper should be left in this dish for about five minutes, or, in other words, for two minutes after the brown, iodised paper appears by the light of a candle to have been turned white, though by day-light it would be found to be a very beautiful canary-yellow.

To economise the solution, the sheet may now be held up by one or two of the corners to drain into the dish for a few seconds, and then plunged into a dish (of dimensions corresponding to the size of the sheet) of distilled water. A second sheet may now be taken, and the whole process of immersion in the exciting liquid commenced with it. As soon as this is thoroughly covered with the solution, and has been agitated as before described, it may remain while the first sheet is being turned over and over in the water, and then transferred to a second dish containing distilled water, in which it is again well washed and afterwards hung up to drain. It should then be placed on a clean white sheet of bibulous paper of a corresponding size, to absorb the moisture, and another sheet of the same bibulous paper laid upon it; by this time the second sheet of excited paper will be ready for treatment in the distilled water in the same manner as the first. Thus any desired number of sheets may be excited.

They should now be placed between fresh pieces of clean white bibulous paper, and kept under pressure, to exclude light and air until required for use.

Paper prepared in this manner will keep perfectly good and equally sensitive for a very long time,* a desideratum of, I think, no small value to the tourist, who knows not how often, nor under what circumstances, an opportunity may occur to him for a sketch; of course the exciting part of the process must be performed only by the light of a candle, or in a room with a yellow blind drawn over the window, which, while travelling in the country, he should always be provided with, and which will also serve for a focusing cloth,—common yellow calico doubled answering perfectly well for the purpose.

Some may consider the use of so much bibulous paper superfluous, or even extravagant, but absolute cleanliness is essential to success; and it would be far better to waste even a dozen pieces of bibulous paper than run the risk of spoiling a single negative picture, to obtain which perhaps many times the cost of the paper has been expended in travelling, or otherwise.

To place the paper in the camera slide, the double paper-frames should be laid open on a table, the glasses in each having been well cleaned; upon one side of one of the glasses a sheet of the sensitive paper, placed with its marked side downwards, or towards the glass, for the purpose of receiving the image; upon the back of this lay a clean piece of dry bibulous paper, previously cut to the size of the frame, then a piece of yellow paper or opaque millboard, sufficiently thick to prevent the light passing through. Again, lay a piece of bibulous paper upon this, and, lastly, a piece of the sensitive paper, with its marked sensitive surface upwards. The whole of this will, of course, also be performed in a dark room, or by the light of a candle. After the frame is closed the whole is ready for exposure in

* It is of the greatest importance that the glacial acetic acid should be perfectly pure, otherwise the whites cannot be obtained perfect, and the whole result will be unsatisfactory; the cheap acid frequently sold under this name is nothing of the kind, and is constantly the cause of disappointment.

* I have kept this paper for as long as six weeks in this country, and then obtained good results; of course, in India, or other warm climates, it would not keep quite so long.

the camera. To regulate the time of exposure in the camera, depending as it does on the focal length of the lens employed, and the amount of light admitted through the diaphragm, must necessarily be left chiefly to the discretion of the operator: a hint or two, however, may not be unacceptable. The size of the diaphragm should vary with the size and distance of the object to be taken. If the object be a single building, and at such a distance as to fill the field of view of the camera, when a 3-inch or No. 2 Voigtlander lens is employed, and its largest opening of ⅞-inch diameter be used, which is sufficiently small, three to five minutes' exposure will be found sufficient. For more distant objects, it is advisable to use the smaller diaphragm or stop, which is about ¼-inch less in diameter, and to increase the length of time of exposure by two or three minutes, as the same surface has to be impressed, and less light to do it with. A few experiments will give a much better notion about the working time of different lenses than could possibly be imparted by many pages of written instructions, so much depending upon the colour of the glass employed in the manufacture of the lenses, which should be perfectly white. This may be ascertained by laying the lense upon a sheet of white paper, and judging from the difference of colour between the paper through the glass and that part not covered.

The picture may be developed with gallic acid immediately after its removal from the camera; or, if more convenient, that part of the process may be delayed for several days.

Whilst at this section of my paper, I may, perhaps, be allowed to describe a method of preparing the solution of gallic acid, whereby it may be kept in a good state of preservation for several months. I have kept it myself for four months, and have found it, after the lapse of that period, infinitely superior to the newly-made solution. This process has, I am informed, been alluded to in photographic circles; but not having seen it in print, and presuming the fact to be one of great practical importance, I trust I shall be excused for introducing it here, should it not possess that degree of novelty I attribute to it.

What is generally termed a saturated solution of gallic acid is, I am led to believe, nothing of the kind. In all the works on photography, the directions given run generally as follow:—"Put an excess of gallic acid into distilled water, shake the mixture for about five minutes, allow it to deposit, and then pour off the supernatant fluid, which is found to be a saturated solution of the acid."

Now I have found, by constant experiment, that by keeping an excess of acid in water for several days, the strength of the solution is greatly increased, and its action as a developing agent materially improved. The method I have adopted is, to put half an ounce of crystallised gallic acid into a stoppered quart bottle, and then to fill it up with water so that, when the stopper is inserted, a little of the water is displaced, and, consequently, every particle of air excluded.

The solution thus prepared will keep for several months. When a portion of it is required, the bottle should be refilled with fresh distilled water, the same care being taken to exclude every portion of atmospheric air; to the presence of which, I am led to believe, is due the decomposition of the ordinary solution of gallic acid.

Of this saturated solution of gallic acid, put into a dish about sufficient to cover the sheet, lay the face of the undeveloped picture downwards in the solution, taking care that no air bubbles are allowed to be present; completely cover this sheet with the liquid, by agitating the dish, &c., and then lay another sheet requiring development with its back on this, or face upwards; again agitate the dish with its contents, so as to entirely cover the whole of the upper surface, and allow the sheets to remain until the pictures partially show themselves. Now pour the solution of gallic acid from the dish into a glass measure, or other convenient vessel, taking care that it is quite clean, and free from any hyposulphite of soda, and add of the aceto-nitrate of silver (the solution left from exciting the paper) in the proportion of from five to ten drops to the ounce; add also one or two drachms of alcohol; stir these with a glass rod, and return them to the dish containing the negatives for their complete development. They should now and then be turned over, that is, the picture which is now at the bottom should be at the top, and so changed two or three times. It is advisable to adopt this means of adding the aceto-nitrate of silver, for if poured directly into the dish in which the negatives are, before being mixed with the gallic-acid solution, a black deposit would be formed upon that part of the dish where it was poured; the picture would also be probably spoiled by its having a marbled appearance in some parts. The solution may sometimes have a tendency to turn cloudy or black, in which case it should be changed for fresh, should the development not be completed; the negative should be allowed to remain in this solution till, by holding it by the corners to the light of a candle, the sky appears perfectly black, when it should be taken out and rinsed in a little clean common water, to wash off the

excess of acid. The picture is now fixed by plunging it into a solution of hyposulphite of soda in common water, in the proportion of 1 oz. of the former to 8 ozs. of the latter. It should be allowed to remain in this solution for from thirty minutes to one hour, or until the yellow parts appear perfectly white and transparent, but certainly not so long as to injure the blacks, which would be the consequence of leaving it too long.

Should some parts of the negative appear of a red colour instead of white, and this is sometimes the case from over exposure in the camera, they may be recovered by immersing the whole in a weak solution of cyanide of potassium of 5 or 6 grains to the ounce of water; by over immersion in this solution the blacks are liable to injury, in which case it is necessary that they be replaced with Indian ink or lamp-black, and prepared ox-gall sold for the purpose (the ox-gall serves only as a vehicle for the ink or lamp-black, and will cause either of the above substances readily to adhere to the waxed paper).

After the fixing is satisfactorily performed, each negative should be allowed to soak for several hours in common water, which should be changed several times in order thoroughly to dissolve out the hyposulphite of soda; unless this be done the picture will eventually be entirely destroyed by the action of this salt.

When sufficiently soaked, the negative should be attached by means of a pin by one of its corners to a shelf or other convenient place; its drying being facilitated by attaching a small strip of bibulous paper to its other extremity.

When perfectly dry, the negative should be held before the fire to remelt the wax it contains, or (which is preferable) placed between two sheets of blotting-paper, and a hot iron passed over it, to diffuse and equalise the wax.

The negative thus finished is ready for printing from; a process to which I hope to draw your attention on a future occasion.

A NEW MINER'S SAFETY LAMP.

BY MARTYN ROBERTS, ESQ., F.R.S.E.

The "Davy Safety Lamp," though the result of some important experiments on flame by the illustrious inventor, is liable to some serious objections; the most important of which are its inefficiency when immersed in currents of explosive gas, and the obstruction its wire gauze presents to the transmission of light from the flame. In consequence of the ready passage of currents of air through the meshes of the gauze the flame is in a manner blown through them, and any inflammable gas outside the lamp is thus exploded, frequently causing great loss of life. Again, the meagre light obtained from the lamp, by reason of the obstruction given to it by the wire meshes, not only renders the lamp of less value to the miner, but often becomes actually a source of danger; for he, vexed at want of light, removes the lamp from its protecting mesh, and an explosion ensues. These evils are so severely felt, that numerous attempts (and many of them very ingenious) have been made to find a remedy; but hitherto perfect success has not been obtained. In several of these inventions a glass cylinder or window is placed around, or in front of the flame; this, while uninjured, enables the miner to obtain more light from his lamp; but should the fragile window be broken, as it readily may be by a fall, or by fragments of coal flying against it, the flame becomes exposed, and if this occur in an explosive gas, destructive effects ensue.

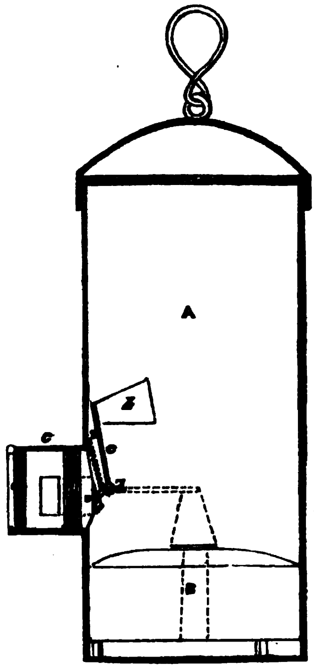
I need not describe the various attempts at improvement, as they are all pretty much of one class, having one object in view. But as it is impossible to make a lamp that shall be invulnerable, it follows that all hitherto contrived with transparent and fragile media for the transmission of light, are positively dangerous and to be avoided.

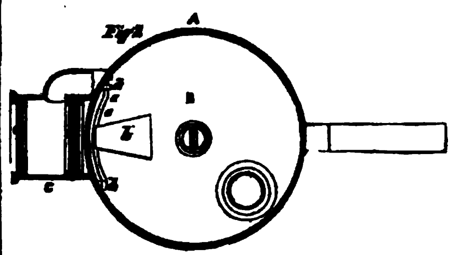
I have therefore contrived a miners' safety lamp which shall deprive itself of all power of exploding gases the moment any injury happens to the lamp itself. I have been entirely successful in this, while, at the same time, the flame of my lamp is protected from all currents of air or gas, and it also gives the miner the full light unobstructed by any mesh. My lamp is constructed in the following manner:

A cylinder of tin or sheet iron, A A, fig. 1, about 9 or 12 inches long, and from 2 to 3 inches in diameter, is covered at the top with two or three layers of wire gauze, of the kind used in safety-lamps; at the bottom of the cylinder is placed the common oil reservoir, B, with its picker or cleaner. The bottom of the cylinder, through which

the air passes to the flame, is protected by wire mesh in the same manner as the top. Into one side of the cylinder, and opposite the flame, is fixed a tube or chamber of tin, C, about one inch long and two inches in diameter; and to each end of this is cemented a glass plate, *a a*, thus forming a closed and watertight chamber. The inner end of this chamber, next to the flame, is continued laterally about 1½ inch square beyond the glass plate (see horizontal section of chamber, fig. 2), and into this is inserted a disk or plate of vulcanized India-rubber, D, which in fact forms part of the side of the chamber; and if this chamber be filled with water, the India-rubber disk will be bent outwards. Against this disk presses the tail, *e*, of one end of a small lever, *c c*, turning on a pivot, *d*, inside the upright cylinder, and on the other end of the lever is fixed an extinguisher, *b*, so that when the lever is at liberty (that is, not supported by the India-rubber disk) it falls with some force, by the pull of a spring, *s*,

Fig. 1.





upon the lamp, and the extinguisher immediately puts out the flame. Fig. 3 is a separate view of the lever and extinguisher. By a convenient aperture the chamber, C, is filled with water through a tube two or three feet high, thus producing a pressure of water within the chamber, which forces out the India-rubber disk; and if the feeding-hole be now closed, the tail of the lever will rest on the elastic disk, and will be supported by the water, which is incompressible, and has no outlet for escape.

The lamp is now complete; let us observe it lighted and in action.

The chamber, with its glass ends, is full of water, transmitting the light of the lamp without hindrance, and the miner is at work in an explosive atmosphere. A fragment of coal from a blow of his pickaxe breaks the glass; this accident, with a lamp of any other construction, would peril his life, but with this new lamp he is safe; for when the glass is broken the water is free to escape, and no longer supports the disk, which is pressed inwards by the lever; down the extinguisher falls, the light is put out, and all is safe. This action, which has frequently been tested, is instantaneous. The escape of a few drops of water is sufficient to make the extinguisher fall. Here then, is a lamp, which by its cylinder protects the flame from currents of air or inflammable gas, by its glass window gives full light to the workman (which may be

increased by a reflector behind the flame), and by the simple water apparatus all danger from a fracture of the glass is entirely avoided. The water-chamber may, if deemed necessary, be made so as to surround the lamp. I may add, that should the flame of the lamp be made so large as to heat the water by metallic conduction, a ring of bone or ivory may be inserted between the chamber and cylinder, which will not add a shilling to the expense. The lamps can be made at about fifteen shillings each. I have no intention of fettering the use of this invention by patent; for where so many lives are concerned I should be sorry to increase the expense of anything, the use of which may be the means of saving them. Competent judges, both scientific and practical, have given their opinions in favour of the invention.

STENSON'S IMPROVEMENTS IN THE MANUFACTURE OF IRON.

(Patent dated November 26, 1853.)

Mr. J. Stenson, of Northampton, has introduced a new method of manufacturing bar-iron, by which, judging from specimens we have had an opportunity of examining, a very superior material is produced.

In the ordinary method of manufacturing bar-iron the heated material about to be converted is passed between roughing rolls, and is thus pressed into flat forge bars, which are cut into suitable lengths and piled one on the other. The pile, thus consisting of a number of flat bars, is placed in a furnace, and when heated to a proper degree is passed between finishing-rolls and rolled out into bars of the substance or size required; and it frequently happens, that in the finished bar so produced it is found, from the imperfect welding together of the various surfaces of the bars of which the pile is composed, that upon punching or working the finished bar there will be a cleavage or lamination in the substance, corresponding to the lines between the flat surfaces of the bars composing the pile. The object of Mr. Stenson's invention is to avoid this liability to cleavage or lamination. For this purpose he employs forge rolls, having grooves so formed in them as to make rough or forge-bars, not of the usual flat form, but of a corrugated, zig-zag form, or fluted in grooves and ridges, in lines corresponding with and parallel to the length of the bars, without confining himself to any particular form of corrugations or flutings, as any form of rough bar may be adopted, the corrugations or flutings of which will admit of being piled together in the manner about to be described.

The inventor cuts bars thus prepared into suitable lengths, and places as many as may be required one upon the other, so as to form a pile, placing also one bar upon the top of and another underneath the pile. These top and bottom bars are made with a plain or flat surface on one side, and with the other side corrugated or fluted, so as to correspond with the corrugations or flutings of the rough or forge-bars which they are to cover. They are made like each other, but are of course of a different form to the bars composing the interior part of the piles. Without these top and bottom bars he considers the advantages of the invention would be materially lessened by the pressure of the corrugated bars into flat or nearly flat surfaces, which would necessarily take place in the next process of manufacture,—that is, the rolling into finished bars. The piles thus completed are placed in the furnace and manufactured into such bars by the ordinary methods now in use.

The inventor says, "I consider that the forms of the corrugations or flutings in the rough bars may be varied to some extent, any form being adopted which experience may show to be most easily produced, and which will admit of the corrugations or flutings of the rough bars, when piled one on the other, fitting into the corrugations or flutings, as well of the rough bars of which the interior portion of the pile is formed, as of the top and bottom bars, so as to prevent any straight line of cleavage or lamination throughout the transverse section of the pile. The rough, or forge bars, may also be made of any width which may be found necessary, and the number of corrugations or flutings may be varied according to the width of the rough or forge bar; but I prefer always to have an odd or unequal number (as 3, 5, 7, or any other unequal number) of corrugations or flutings, as otherwise it would be found necessary to have the top and bottom bars, differing from each other in form, which would create additional expense. For the same reason I prefer always to adopt such a form of corrugation or fluting as will permit the piles to be covered or completed by top and bottom bars, of one and the same form. The width of the rough or forge bars, as well as the number of the pieces or lengths required in forming the pile, will be regulated by the proposed size and weight of the finished bar intended to be made. The advantages obtained by my invention are, that there are no straight lines through the transverse section of the pile, and the liability to cleavage and lamination in the finished iron is greatly reduced or entirely prevented. The welding surface is also considerably increased, and the welding and cohesion of

the parts composing the pile rendered more perfect."

THE MANUFACTURE OF IRON.

BY DR. NOAD.

(*Concluded from page 515.*)

Theory of the Blast-Furnace.—Though much has been written on this subject, it can scarcely be said that any very sound scientific views were entertained respecting the theory of the blast-furnace previous to the beautiful researches of Professors Bunsen and Playfair, and more recently those of the late lamented Professor Ebelmen, on the gases evolved from the furnace at different depths.

Tables in which these experiments were compared were referred to; the difference in the results may in a great measure be explained by the circumstance that the English furnace (Alfreton, in Derbyshire) was working entirely with coal, whereas the Seraing furnace, on which M. Ebelmen's experiments were made, was working with *coke* alone; this would at any rate explain the difference as relates to the carburetted hydrogen and hydrogen gases; mere traces of the former were found by Ebelmen, while Bunsen and Playfair found as a maximum 8·23 per cent. of the former, and 12·42 per cent. of the latter. As it is probable, however, that neither of these gases takes any share in the reduction of the ore, their presence or absence will not materially interfere with the discussion of the theory of the blast-furnace.

Both series of analyses show, what at first sight appears most remarkable, viz.: that the gases in the immediate neighbourhood of the blast do not contain a *trace* of carbonic acid, showing that powerful oxidizing and de-oxidizing actions must take place at that point. Here also in the English furnace were found *Cyanogen* and vapours of *Cyanide of potassium*; in the *Seraing* furnace no *Cyanogen* was detected, but abundance of *Cyanide of potassium* and vapours of *oxide of zinc*. The Cyanide of potassium, which, doubtless from its powerful reducing action exercises an important influence on the reduction of the stubborn forge cinder, is formed by the action of the nitrogen of the blast on the red hot carbon of the fuel in the presence of potash derived from the ore. Bunsen and Playfair calculated that in the Alfreton furnace 224·7lbs. of this salt were produced daily.

The conclusions deduced by Bunsen and Playfair from their gas analyses are, that the reduction of the iron minerals, and the disengagement of carbonic acid from the limestone, takes place at a depth of between 24 and 25 feet, that is in the *boshes* of the furnace, the cone or body of the furnace being entirely taken up in the process of *coking* the coal. Ebelmen thinks, on the other hand, that the rapid diminution of carbonic acid and corresponding increase of carbonic oxide in descending the furnace, which are shown by his analyses, indicate conclusively that an energetic reduction of ore takes place in the vicinity of the mouth of the furnace, that reduction being effected by carbonic oxide, under the influence of the high temperature of the ascending gases without any change in the volume of the gas, and without any consumption of fuel. This mutual relation of the carbonic acid and carbonic oxide gases is not observable in the analyses of Bunsen and Playfair, which Ebelmen attributes to the circumstance that those chemists collected their gases through narrow iron tubes, which, becoming intensely heated and partially choked by the fragments of ore and fuel introduced by the rapid stream of gas, so modified the composition of the gases that the analyses, however carefully conducted, could not represent accurately the actual composition of the furnace gases. Ebelmen collected his gases through wide tubes, and from the lower part of the furnace, by piercing the solid masonry. According to Ebelmen's analyses, the gases between the depths of 12 and 45 feet are composed almost entirely of carbonic oxide and nitrogen. The proportion of oxygen to nitrogen at 12 feet is as 29·9 to 100; in atmospheric air it is as 26·3 to 100; the difference amounting to 3·6 represents the oxygen arising from the bed of fusion from the Tuyeres to this height. It arises from the reduction of the silicates of iron constituting the forge cinders, which takes place between the Tuyeres and the depth of 12 feet. Without wishing in the slightest degree to impugn the accuracy of Bunsen and Playfair's analyses, it was considered that the conclusions of Ebelmen accord best with the general phenomena of the blast-furnace, inasmuch as if the reduction of the ore only takes place in the *boshes*, as the former chemists suppose, there seems no reason why furnaces should not be built one half their present height, and the fuel consist entirely of coke. It is found, however, practically impossible to reduce materially the height of the furnace; but this is at once intelligible, if we suppose that the oxide of iron is reduced principally in the cone, and that in its descent through the boshes to the crucible *it acquires from the fuel* that proportion of carbon which it requires to bring it to the state of fusible cast-iron. It is very desirable, however, that this interesting chemical question should undergo further elucidation at the hands of

some chemist properly skilled in the difficult subject of gaseous analyses.

The practical application of the furnace gases was lastly briefly alluded to. It was shown, on the authority of Bunsen and Playfair, and from calculations deduced from data furnished by the posthumous papers of Dulong, that of the heat produced by the combustion of the fuel in a coal-fed blast furnace, only 18·5 per cent. is realised in carrying out the processes of the furnace, the remainder 81·5 per cent. being lost. This loss in well conducted establishments is no longer permitted. The gases are now collected at the mouth of the furnaces and conveyed by large pipes underneath the boilers of the engines and round the hot-air stoves. The principle has been carried out in great perfection at Cwm Celyn: the pipes are six feet in diameter, and are lined with fire-brick; and the gases from *two* furnaces only more than suffice for the supply of seven boilers, and for the hot blast for both furnaces, at a saving of full 10,000 tons of coal a year.

CAPTAIN NORTON'S RIFLE-CANNON.

To the Editor of the Mechanics' Magazine.

Sir,—More than two months ago I challenged all artillery, as now constructed, to compete with my rifle-cannon for extent of range and accuracy of fire, and backed my challenge with a wager of one thousand pounds; but it has not been taken up. I now offer the same wager of one thousand pounds that I will fire my rifle-cannon by a new process, which will prove itself far more rapid than any manner of firing now practised in the British service. I would say, that by my plan I can fire *two* shots for one of the present mode of firing, and that I require but one man to assist me at the gun; and as bombardment appears to be quite the fashion now a-days, a plan of firing, by which *one* gun shall do the duty of two, appears to me to be a consummation devoutly to be wished for. The cannon that I use for this rapid firing is cast with the rifles ready formed, which are four in number, equally divided, grooves and bearings, with a three-quarters turn in four feet, and two-inch bore. Any person choosing to call a two-groove rifle not a rifle, but a gun with an elliptic bore, may call my rifle-cannon a double-elliptic bore gun.

The manner in which I charge the percussion-shell for this cannon is as follows: the *glazed* cannon powder being very *hard* in its grains, is put into the chamber of the shell, mixed with a few heads of Bell's congreves; the open front of the shell is then closed with a piece of cork, sunk about a quarter of an inch below the orifice; the shell on striking a plank explodes, by means of the plug cut out of the plank crushing the hard grains of the powder and the heads of the congreves together; the same result takes place from firing into a bank of clay or sand. The explosion of the shell can be caused by other means, but this is a very simple and efficient one.

A rifle-carcass charged with Valenciennes's composition will become red-hot after a few minutes burning. This may be proved by charging a lady's or even a tailor's thimble with the composition, and fixing the head of one of Palmer's vesuvians in its centre, level with the surface. When the vesuvian is ignited, it will fire the composition; and if this is done in the dark, the thimble will be seen to become red hot; and as this rifle-cannon will carry *one-fourth* farther than a cannon of the same bore *not* rifled, these carcasses will be found very efficient for bombardment and in naval warfare, doing duty for red-hot shot. I have forwarded this cannon to the Turkish Minister of War at Constantinople, together with the projectiles for it, in charge of Captain Kellock, commanding the Himalaya. The cannon was cast *ready* rifled, in the foundry of Messrs. Lecky and Beale, Cork.

J. Norton.

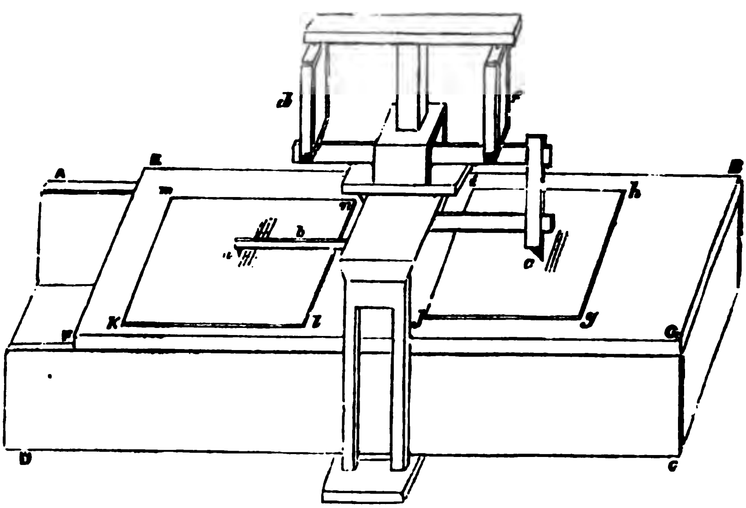
Victoria Hotel, June 5, 1854.

ELECTRO-MAGNETIC ENGRAVING MACHINE.

The want of a rapid and cheap mode of producing illustrations in connection with letter-press printing has long been felt, and every day the necessity becomes more and more urgent. Wood engraving, which is now used for the purpose, however good in its results, takes some time in its preparation, and requires the employment of a skilled artist. Various chemical inventions for producing a means of surface printing have been made, and modifications of the electrotype processes have been used for this purpose. None of these means are sufficiently satisfactory or comply with the necessary condition of rapidity and cheapness of production. Recourse has been taken therefore to mechanical means for obtaining the desired end, and a machine has been invented by Mr. W. Hansen, which appears to perform its work well. The machine is somewhat on the principle of the well-known planing machine. The drawing to be copied and the plate to be engraved are placed side by side, on the moveable

table or lid of the machine; a pointer or feeler is so connected by means of a horizontal bar, with a graver, that when the bar is moved, the drawing to be copied passes under the feeler, and the plate to be engraved passes in a corresponding manner under the graver. It is obvious that in this condition of things, a continuous line would be cut on the plate, and, a lateral motion being given to the bed, a series of such lines would be cut parallel to and touching each other, the feeler of course passing in a corresponding manner over the drawing. If, then, a means could be devised for causing the graver to act only when the point of the feeler passed over a portion of the drawing, it is clear we should get a plate engraved, line for line, with the object to be copied. This is accomplished by placing the graver under the control of two electro-magnets, acting alternately, the one to draw the graver from the plate, the other to press it down on it. The coil enveloping one of these magnets is in connection with the feeler, which is made of metal. The drawing is made on a metallic or conducting surface, with a rosined ink, or some other non-conducting substance. An electric current is then established, so that when the feeler rests on the metallic surface, it passes through the coils of the magnet, and causes it to lift the graver from the plate to be engraved. As soon as the feeler reaches the drawing and passes over the non-conducting ink, the current of electricity is broken, and the magnet ceases to act, and by a self-acting mechanical arrangement the current is at the same time diverted through the coils of the second magnet, which then acts powerfully and presses the graver down. This operation being repeated until the feeler has passed in parallel lines over the whole of the drawing, a plate is obtained engraved to a uniform depth, with a fac-simile of the drawing. From this a type-metal cast is taken, which, being a reverse in all respects of the engraved plate, is at once fitted for use as a block for surface printing.

The annexed diagram shows the arrangement of the instrument. A, B, C, D, is the frame, on which the bed E, F, G, traverses; *m*, *k*, *b*, *n*, the drawing to be copied: *j*, *g*,



h, *i*, the plate to be engraved; *a*, the feeler connected with the graver, *c*, which works on a lever carrying the armatures of the two electro-magnets, *d* and *e*, which act alternately to raise or depress the graver, as the feeler passes over the conducting or non-conducting surface of the drawing.—*Journal of the Society of Arts.*

SUBMERGED SUPPLEMENTARY PROPELLERS FOR THE NAVY.

To the Editor of the Mechanics' Magazine.

SIR,—The propulsion of steam vessels by means of the screw is fast gaining on the paddle-wheel system; it undoubtedly possesses advantages, and is peculiarly

adapted for the purposes of warfare; but it is open to this serious objection, that a concussion which would only in a moderate degree damage a paddle-wheel, would in all probability completely disable a screw. This is proved by facts which have occurred. Some of our screw packet ships have in long voyages lost their screws entirely (while their machinery has been uninjured), and the delivery of their mails has been thereby considerably delayed; others, after departure, have been compelled to put into port, and await the arrival of another screw.

I am of opinion that the screw will not always be relied on as the sole propeller, but that a higher speed and greater stability will be obtained by vessels having paddles as well as the screw. I am aware that separate engines must be employed for driving propellers caused to revolve in such opposite directions; but if steam packets are furnished with paddles of the usual diameters, and one-third only of the usual width, in addition to the screw, the same amount of steam power being employed as at present, the advantage of having a second means of progression, in case of the failure of the screw, would more than compensate for any objections as to cost or weight of machinery.

Should I be right in these suppositions, it would still, however, be impracticable to apply such paddles to our large vessels of war, and as I believe that it is highly desirable that they should be provided, in addition to the screw, with other efficient submerged propellers, I beg to suggest the following method.

We know from the facility with which a steam tug-boat, with comparatively small paddles, can tow a large ship, that it is not absolutely necessary, for giving motion to a vessel, that paddles should be of the enormous dimensions now generally used. I therefore propose that ships of war, their upper decks being of the present approved form, should have the lower portion of their hulls, amid-ships, below the water-line, reduced in width so as to admit of submerged paddle-wheels (being fitted to their sides), which should not project much beyond the line or swell of the lower deck. These paddles (of the ordinary form and construction) of from 12 to 16 feet in diameter and of width according to circumstances, should be fitted with feathering floats and revolve in air-tight paddle-boxes or cases, which should completely enclose two-thirds of the upper portion of the diameters of the paddle-wheels, leaving only the lower one-third exposed to action in the water. By having an ordinary air-pump worked by the steam engine, a cylinder with a movable piston (loaded to a pressure greater than sufficient to overcome the pressure of the water at the lowest depth of the ship) could be maintained, charged with compressed air. This cylinder should have a pipe leading to a recess (on each side of the ship) communicating with the interior of the air-tight paddle-cases, the water within these recesses being protected by a perforated metal plate from the turbulent motion of the water agitated by the paddles. The ends of the air-pipe, placed on a level with the lower edges of the paddle-covers, should have fitted to them common ball taps (their action reversed); these taps would necessarily allow compressed air to pass from the cylinder, enter within the paddle-cases, and displace the water therein down to the level of the lower edges of the paddle-cases, and there maintain the level or water surface; thus the upper portions of the paddles would always revolve in compressed air, the lower portions acting effectively in propelling the vessel forward or backward. The paddles should have a separate and independent action, so that while one paddle urges the vessel forward, the motion of the other may be reversed; by which arrangement a most important means of steering and of quickly wearing round would be commanded.

The paddle-cases should, as near as possible, be lost in the sweep of the vessel's form, and have a mode of access to their interiors (on the principle of that described in your Magazine, No. 1526, page 362), provided by a suitable air-tight trap-way (in the side of the paddle case), large enough to admit the body of a man and materials for repairing the floats, etc. This trap-way must be enclosed within a second air-tight chamber, having also a suitable trap-way communicating with the interior of the ship; men and repairing materials, tools, etc., being admitted within the first chamber, and the trap-way secured air-tight; compressed air must be admitted by opening a valve conducting air from the interior of the paddle-case, then the inner trap-way being opened, men could, from the outer air-tight chamber, enter into the paddle-case and effect repairs when at sea, if necessary. The covers of the trap-ways might have fixed in them strong glass, so as to admit light and enable the men employed within the cases to communicate by signals with others without, and the men employed within would, by fastening up the ball tap (or otherwise keeping it open), ensure a supply of air from the charged cylinder; the air-pump being worked by manual power when the steam engine is not available.

I am, Sir, yours, &c.,

E. Cocks.

P. S.—I make no allusion to other pre-

viously proposed submerged propellers, because I think the contrivances employed for diminishing the effect of the back-stroke are too liable to injury to allow of their being adopted: and I mention "feathering floats" because they lift less water, and would consequently by their motion displace a smaller quantity of the compressed air contained within the paddle-cases, than would the common paddles with fixed floats.

Shaft, paddles, a second pair of cylinders, etc., and air-pump, would be required for the method I now suggest; steam being conducted from the same boilers as at present employed for the screw.

E. C.

ON M. DE FERMAT'S GENERAL THEOREM.

To the Editor of the Mechanics' Magazine.

SIR,—The above profound mathematician, in his Notes on the Questions of Diophantus, asserts that the equation $x^n + y^n = z^n$ is always impossible for every integral value of n greater than 2. This was left by him, like many other of his invaluable productions, without demonstration, and has never been completely investigated by any writer whose labours have fallen into my hands.

Presuming that your valuable Journal finds its way into the closets of nearly all the mathematicians of the present day, I hope that some of them will furnish you with a complete solution to it, if you can only find room in an early number of your Journal.

I am, Sir, yours, &c.,

INVESTIGATOR.

MUSGRAVE'S PATENT IMPROVEMENTS IN STOVES.

To the Editor of the Mechanics' Magazine.

SIR,—In your Number for this day, Messrs. Musgrave's Patent for Improvements in Stoves, No. 2652, is reported as one not proceeded with, whereas this patent was sealed on the 30th ult., as appears by the list in the same number of your Magazine.

It unfortunately happened that Her Majesty's Solicitor-General could not find time, in the space of five days, to affix his sign-manual to the warrant for this patent, and it therefore became necessary to apply to the Lord Chancellor to extend the time for sealing and filing, which extension has been granted.

As the notice in your Magazine might prejudice the patentee, I trust you will be so obliging as to set the matter right.

I am, Sir, yours, &c.,

CHARLES BARLOW.

June 3, 1854.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

HOFFSTAEDT, AUGUSTUS JOHANN, of Albion-place, Surrey, agent. *An improved mode of preparing the colour known as artificial ultramarine.* Patent dated November 17, 1853. (No. 2670.)

The object of the inventor is to give consistency to the powdered colour, in order to prevent it from dissolving as readily as usual, so that the coagulation of loose particles in the water may be avoided; and the invention consists in mixing artificial ultramarine with a glutinous matter, fuller's earth, or other binding medium not detrimental to the colour.

GRIFFITHS, ROBERT, of the Strand. *Improvements in propelling vessels.* Patent dated November 17, 1853. (No. 2671.)

This invention relates to screw and flat-bladed propellers, and consists of a mode of fixing such propellers to their shafts. For this purpose the boss fixed to the shaft is made with sockets, one for each propeller blade, into which sockets are introduced the shanks of the blades, which are each provided with a projection on either side, so that when a shank has been introduced into a socket and turned partly round, the blade will be held; and to retain the blades in their proper positions, keys are introduced through suitable openings in the boss. The invention also applies to vessels in which the propeller shaft is passed through an opening in the rudder.

HOLMES, THOMAS, of Pendleton, Lancaster, bleacher. *Improvements in ventilating drying stoves.* Patent dated November 18, 1853. (No. 2676.)

This invention consists in improving the ventilation of drying stoves, by conveying the heated air, after it has absorbed the moisture in the goods to be dried, through flues, which are opened when required and which are placed by preference near the floor of the drying stove.

RÉMOND, AMÉDÉE FRANÇOIS, of Birmingham, Warwick, gentleman. *Improvement or improvements in the construction of steam boilers or generators.* Patent dated November 18, 1853. (No. 2678.)

Claim.—The application of corrugated plates of metal or of plates of metal partially corrugated to the construction of steam boilers or generators, the said plates being so made and used that the corrugations shall be transverse in the finished boiler.

TAYLOR, WILLIAM, of Park-street, Gloucester-gate, Regent's-park. *Improvements in anchors.* Patent dated November 18, 1853. (No. 2679.)

This invention consists in forming anchors hollow, and of an alloy or alloys, in each of which copper predominates.

MELVILLE, JAMES, of Roebank Works, Loch-winnoch, Renfrew, North Britain, calico-printer. *Improvements in printing textile fabrics and other surfaces.* Patent dated November 18, 1853. (No. 2680.)

In this invention (which is a modification of a former patent), a cylinder of large diameter is used as the printing surface, and this is carried upon a horizontal spindle or suitable end standard framing, each end standard projecting forward on the printing side to form bracket supports for a longitudinal slide rest-plate or bed. This bed is planed and fitted up like the corresponding part of a slide lathe with adjustable headstocks for carrying the surface printing roller, which is built up solid upon a short spindle, the ends of which are centred so as to enable the roller to be accurately turned in a lathe before fitting in for printing. The same end centres answer for carrying the roller during printing. One of the sliding headstocks has a short adjustable centre like the following headstock of a lathe, whilst the other one supports in a bearing one end of a correspondingly centred spindle which projects beyond the headstock and carries a toothed pinion in gear with a large wheel fast on the main cylinder shaft. The roller spindle is connected to this driving shaft by a "dog" or adjustable catch plate, as in a lathe, so that the setting of the roller is facilitated on starting to work.

CLAVIERES, JEAN BAPTISTE, of Paris, France, engineer. *An improved mode of giving publicity.* Patent dated November 18, 1853. (No. 2681.)

This invention consists in constructing urine-columns, the upper parts of which are transparent and illuminated from within.

POOLE, MOSES, of the Avenue-road, Regent's-park, Middlesex. *Improvements in surface-condensers, and in evaporators and heaters for steam engines.* (A communication.) Patent dated November 18, 1853. (No. 2682.)

This invention consists in a method of confining the tubes of a surface-condenser in their tube-sheets by means of a supplementary or auxiliary tube sheet of vulcanized India-rubber or gutta percha, by which the joints between the exterior of such tubes and tube sheets is made air and water-tight, or nearly so, while each tube is free to expand and contract, or slide to and fro in the tube sheets.

O'NEILL, PATRICK BENIGNUS, of Paris. *An improvement in the manufacture of perforated buttons.* (A communication.) Patent dated November 18, 1853. (No. 2683.)

This invention consists in making each button with a central hole for the passage of the needle and thread, in combination with other holes placed around it.

BROWN, JOHN HARCOURT, of Arthur's-seat, Aberdeen. *Improvements in the manufacture of artificial skins.* Patent dated November 18, 1853. (No. 2684.)

This invention consists in reducing the cuttings, &c., of hides and skins to a pulp, and then rolling or otherwise pressing them into sheets.

COTTAM, HENRY RICHARD, of Sussex-terrace, Hyde-park Gardens. *Improvements in the construction of portable houses.* Patent dated November 18, 1853. (No. 2685.)

Claim.—The application of iron sockets and dovetail joints for the putting together portable houses.

NORRIS, RICHARD STUART, of Warrington, Lancaster, railway engineer, and EBENEZER TALBOTT, of Crewe, Chester, manager of iron-works. *An improvement or improvements in the manufacture of iron.* Patent dated November 18, 1853. (No. 2687.)

The inventors construct two refineries of suitable dimensions, and place them between two puddling furnaces. One of the refineries receives its charge at a given time, and as soon as this arrives at the middle stage of the refining process the second takes in its charge, and the two thus continue to alternate in working, providing a constant supply of hot refined metal to meet the demands of the puddling furnace, as the respective heats are drawn from it.

HARRIS, JAMES, of Hanwell, Middlesex, engineer. *Improvements in apparatus for heating water and other fluids.* Patent dated November 19, 1853. (No. 2688.)

This apparatus consists of a vertical cylinder or vessel fitted with a series of tubes, and with a second or false cover at each end, forming chambers for the admission and exit of water or other fluid. The steam is admitted into the cylinder and around the tubes, and the water is heated by passing through the tubes.

CASTETS, AUGUSTE, civil engineer, of Paris, France. *An improved composition for curing diseases in the feet of animals.* Patent dated November 19, 1853. (No. 2689.)

This composition consists of a mixture of "animal oil, gum copal or resinous gum, tar, the solution of an alkali, wax, and tallow."

POOLE, MOSES, of Avenue-road, Regent's-park, Middlesex. *Improvements in breech-*

loading fire-arms, and in cartridges for use with such fire-arms. (A communication.) Patent dated November 19, 1853. (No. 2690.)

Claims.— 1. "Attaching the cone or nipple for the percussion cap to the upper part of the breech pin, fitted to slide in the line of the axis of the barrel." 2. Sustaining the breech-pin against the recoil of the explosion by the use of a blocking-piece set on a centre, and moving in a chamber opening to the top of the stock, when the breech-pin and blocking-piece are connected by means of a link, fitted with an elongated hole at the joint.

AUSTIN, WILLIAM, of Holywell-street, Westminster. *Improvements in the manufacture of tiles and tubes.* Patent dated November 19, 1853. (No. 2691.)

In this invention the dies through which the clay or brick-earth is forced are each made with six equal sides, so that the tubes will be hexagonal, and consequently pack without loss of space.

DIMSDALE, THOMAS ISAAC, of Dublin, gentleman. *The use and preparation of certain solid and liquid substances for the defecation, purification, and decolorization of saccharine juices, and syrups or solutions, and for neutralizing, decomposing, and absorbing noxious and fœtid gases.* Patent dated November 19, 1853. (No. 2693.)

The inventor proposes to employ for the defecation, purification, and decolorization of saccharine juices and syrups or solutions, a mixture of blood and certain other substances; and for neutralizing, decomposing, and absorbing noxious and fœtid gases, mixing and saturating these substances with the water of mines containing a metallic salt or oxide, and evaporating the water of the mixture.

POTTER, JOHN GERALD, carpet manufacturer, and ROBERT MILLS, designer, both of Darwen, Lancaster. *Certain improvements in the manufacture of carpets.* Patent dated November 19, 1853. (No. 2694.)

The inventors calculate the exact amount of warp which the terry fabric is required to take up in the formation of a given length of tapestry carpet, and having thus ascertained the amount of warp surface required to be exposed to the printing operation to complete one pattern, they then prepare a warp cylinder, with a circumference corresponding to that surface, and graduate the cylinder agreeably to the divisions on the side of the paper pattern, and number the cylinder in like manner. The operator is then enabled to produce the pattern on the warps in such manner, that when woven into a terry fabric, the pattern will be rendered without the undue expenditure of wool, which is at present required to produce a similar result.

WHARTON, EMANUEL, of Birmingham, Warwick, engineer. *Improvements in the manufacture of railway wheels.* Patent dated November 19, 1853. (No. 2695.)

In this invention the wheel is in two parts, and formed with a rib, the tyre being turned with a slight taper on either side of the rib; and in putting it together, the tyre is first slightly heated, and the halves of the wheel are then drawn tightly into the tyre with bolts and nuts until they come into close contact, and have a firm hold of the dovetailed rib; distance pieces are then placed between the arms of the wheel, the screw-bolts are removed one at a time, rivets being inserted in their places, and the whole is securely rivetted together; or bolts and nuts are employed instead of rivets, if considered desirable.

TUCKER, WALTER HENRY, and WILLIAM RASHLEIGH REEVES, both of Tiverton, Devonshire. *Improvements in locks.* Patent dated November 21, 1853. (No. 2698.)

Claims.—1. The application to locks of a moveable box or enclosure surrounding the combination parts, and cutting off all communication with them from the external key-hole during the time the opposing piece is or can be in contact with them, and part of the box, by passing behind the bolt when it is out, preserves the lock from injury by force applied against the bolt. 2. The application to locks of an auxiliary key-bit (acted upon by the key), serving to operate upon the moveable box, so as to complete the closing up of communication with the combination parts, when the opposing piece is or can be in contact with them, and which auxiliary bit may be used to propel the bolt. 3. The application to locks of a pipe-shaped metallic spring, fixed to the back of the surface-plate of such locks around the key-hole, for the purpose of keeping the auxiliary bit steady to its work.

SIBBALD, ROBERT JAMIESON, of Paddington Edge-hill, West Derby, Lancaster, surgeon. *An improved mode of communicating from vessels to the shore, or from one vessel to another.* Patent dated November 21, 1853. (No. 2703.)

This invention consists in constructing, as a light buoyant float or buoy, an inflated bag or balloon, made of any water or air-proof materials, within or around which is wound a cord, so that the coil of cord is carried by the float in such a way, that when the apparatus is cast into the sea, and one end of the coil is held on board the vessel, the float may be blown to the shore, bearing the other end of the cord with it, and thus effect a communication from the vessel to the shore.

RADCLIFFE, AUGUSTUS, of Chichester-place, King's-cross, Middlesex, glaziers' diamond manufacturer. *An improved construction of glaziers' diamond.* Patent dated November 21, 1853. (No. 2704.)

In carrying out this invention, in one edge of the swivel-plate which carries the diamond, notches are formed, having parallel sides, and of a width to correspond to the different thicknesses of glass in common use. When therefore the workman has cut the glass with the diamond, he can readily nip off the superfluous or waste pieces, by applying the notched swivel-plate.

JOYCE, WILLIAM, of Greenwich, Kent, engineer, and THOMAS MEACHAM, of the same place, engineer. *Certain improvements in marine steam-engines.* Patent dated November 21, 1853. (No. 2706.)

The inventors make the piston of a hollow or cup-like form in the centre, the bottom and cover of the cylinder being of a corresponding shape. The recess in the cylinder cover receives the end of the connecting-rod attached to the crank of the propeller-shaft. By this arrangement the crank may be placed much nearer to the cylinder than ordinarily, and the space occupied by the engine is proportionably decreased.

BRIGGS, EDWARD, of the Castleton Mills, near Rochdale, Lancaster, manufacturer. *Improvements in weaving and manufacturing raised pile fabrics, and in machinery employed therein.* Patent dated November 22, 1853. (No. 2707.)

The object of this invention is to produce fabrics whose upper and under sides shall be of various materials and colours.

Claims. — 1. A certain application of double shuttle looms. 2. Subjecting silk yarn to the action of a bath of diluted sulphuric or other suitable acid. 3. Placing rollers so as to act diagonally on the fabric on which a pile is to be raised, and combining therewith a table with an elastic surface. 4. The application to shearing-machines of a comb or combs, to which a revolving or eccentric motion is given for raising the pile before it is sheared. 5. Certain improved machinery for ironing or smoothing the surface of fabrics.

MEE, WILLIAM, of Leicester, manufacturer. *Improvements in the manufacture of braces.* Patent dated November 22, 1853. (No. 2710.)

This invention consists in so arranging and adapting parts of warp machinery that fabrics may be produced with ribs on both sides.

BIRD, ALFRED, of Birmingham, Warwick, chemist. *Certain improvements in apparatus to be employed for the purpose of communicating signals on railway trains and railways, which improvements are also applicable to other similar purposes.* Patent dated November 22, 1853. (No. 2711.)

This invention consists in an arrangement of flexible tubing, barrels, reservoirs of fluids, and levers.

ADAMS, ROBERT, of King William-street, London. *Improvements in fire-arms.* Patent dated November 22, 1853. (No. 2712.)

This invention is intended to avoid the necessity of exerting any considerable force in firing the gun or pistol after the aim is taken. "For this purpose," says the inventor, "I prefer to use a driver, put in motion by the trigger, which acts on a notch of the hammer, and overcomes the main spring; a pall or catch then retains the hammer at cock. On again pulling the trigger, the driver moves away the pall or catch, and releases the hammer, and leaves it to the effort of the main spring."

LEVICK, FREDERICK, of Cwm Celyn and Blaina Iron-works, Monmouthshire, iron-master, and JOSEPH FIELDHOUSE, of the same place, engineer. *Improvements in machinery for raising coal and minerals from collieries and mines.* Patent dated November 22, 1853. (No. 2714.)

Claim.—Constructing the drums with worms or grooves so as to work with two ropes or chains.

RAMSAY, CHARLES, of North Shields, brass founder. *Improvements in ships' and other pumps.* Patent dated November 22, 1853. (No. 2716.)

At the upper end of the suction pipe of Mr. Ramsay's pump there is a divided valve box, one chamber of which communicates with one end, and the other with the other end of a horizontal cylinder, in which a piston is worked by suitable gearing. The valves in this valve-box open inwards, and there is a man-hole or covered opening, by which they can readily be got at; and there is also a divided passage or outlet, one branch communicating with one end, and the other with the other end of the cylinder, each branch being closed with a valve opening outwards, so that when either of the branches are not delivering water, it is closed air tight.

PEGG, WILLIAM, of Leicester. *Improvements in instruments for cutting out parts of garments and other articles, and in grinding and sharpening cutters for the same.* Patent dated November 22, 1853. (No. 2717.)

This invention consists in mounting a circular cutter on an axis carried by a cranked arm, one end of which turns freely in a handle. The table on which the cutter cuts is formed of zinc. The invention also consists in constructing a grinding machine for sharpening the cutters.

ARDING, FRANCIS, of the Albert Iron-

works, Uxbridge, Middlesex, agricultural implement manufacturer. *Improvements in machinery for cutting, splitting, and bruising vegetable substances.* Patent dated November 22, 1853. (No. 2718.)

Claims.—1. The application and use of combined concave and convex cutters, for cutting chaff and litter. 2. The application and use of a grooved roller, in combination with a knife-edged cutter or cutters, for bruising or splitting oats and peas, &c. 3. The application and use of any one or more of the above arrangements, either separately or combined, in one machine.

BURLEIGH, BENJAMIN, of the Great Northern Railway, King's-cross, Middlesex. *Improved railway crossings, as adapted to the double-headed rail and the ordinary rail and chair.* Patent dated November 22, 1853. (No. 2719.)

This invention "consists of certain pieces of solid metal, called flange bearers, being inserted and bolted between the wing rails, and between the wing and point rails, for giving support to the flanges of the wheels, while passing over them, and thereby greatly increasing the strength and durability of the crossings."

ABRAHAM, HENRY ROBERT, of Howard-street, Strand, Middlesex. *Improvements in coffins and in hearses, and improvements in receptacles for coffins for their transmission.* Patent dated November 23, 1853. (No. 2720.)

This invention consists—1. In forming coffins of a mixture of cement and sawdust, or similar substances. 2. In forming air-tight cases as receptacles for coffins. 3. In constructing hearses, the interiors of which are divided by movable partitioning, and shelving, so as to permit it to carry one or more coffins, and also the attendants inside of it instead of upon the roof.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

KEOGH, PATRICK FRANCIS, and WILLIAM ASHLEY WILSON, both of Liverpool, Lancaster, engineers. *Improvements in steam engines.* Application dated November 18, 1853. (No. 2672.)

"In many steam engines at present in use," say the inventors, "the quadrant is employed, but is always worked by an eccentric. Now by our improvement the cylinder is made to oscillate, and thereby give the valve stroke more or less at pleasure, according as the quadrant is raised or lowered."

PARSONS, PERCEVAL MOSES, of Duke-street, Adelphi, Middlesex, civil engineer. *Improvements in railway and other carriages and vehicles.* Application dated November 18, 1853. (No. 2673.)

The inventor constructs carriages with certain mechanical arrangements which, when thrown into gear by hand or otherwise, will cause the rotary motion of the wheels or axles to force the brakes of the same carriage into action; or will cause the rotary motion derived from a periphery of a certain wheel or ring turning at one rate of speed to be applied against that of another wheel turning at a different rate of speed or in a different direction.

GUY, ALFRED, of Upper Rosoman-street, Clerkenwell, Middlesex, iron worker. *A portable water closet, with water supply without the action of pump.* Application dated November 18, 1853. (No. 2674.)

In carrying out this invention a cistern or outer case is constructed and lined with metal, for the purpose of containing a quantity of water. Into this cistern is fitted a movable pail, so as to allow room for the water contained in the cistern to remain of a certain depth at the bottom, a space being left between the sides of the inner and outer cisterns. The pail is constructed to receive a closet-pan made of metal, lined with glass, and fitted with a trap-valve, worked by means of a weight attached at the bottom.

FERNIHOUGH, CHARLES, and JAMES FERNIHOUGH, of the firm of John Fernihough and Sons, of Victoria Iron-works, Dukinfield, Chester, boiler-makers, iron founders, &c. *Improvements in machinery or apparatus for wringing or twisting, glossing, stretching, and drying silk, cotton, wool, flax, and other fibrous materials.* Application dated November 18, 1853. (No. 2675.)

This invention mainly consists in constructing a machine which wrings or twists fibrous materials after they are dyed or scoured, for the purpose of giving them a better gloss and more even fibre than can be obtained by hand-twisting alone, or by hand-twisting aided by sticks.

GALL, JAMES, junior, of Edinburgh, Scotland, sculptor. *Improvements in electro-magnetic engines.* Application dated November 18, 1853. (No. 2677.)

This invention consists mainly in applying to electro-magnetic engines magnetic cylinders, which form the terminations of the poles of double magnets, and are mounted on axles at each end, and trains of internal and external cylinders also mounted in such manner as to be capable of revolving with their cylindrical surfaces close to the magnetic cylinder.

RICE, JAMES, of Foley-place, Middlesex, surgeon, and WILLIAM MATTHEWS, of Portugal-street, same county, surgical instrument maker. *Improvements in instruments*

for taking and applying vaccine matter. Application dated November 18, 1853. (No. 2686.)

In this invention a cylinder or barrel is used, having within it a piston movable by a piston-rod, like a syringe. To the piston is applied a grooved point, which is capable of being passed out from and drawn back through the end of the cylinder or barrel, the outer end of which is made somewhat concave, and with a small hole in the centre for the passage of the puncturing point, while, on the interior of the end is a small chamber, through which the pivot passes.

ROWLAND, ELLIS, of Mossley, near Belfast. *Improvements in apparatus to be applied to a railway truck or carriage, to enable a guard or person to sound a whistle, and when necessary to put such truck or carriage in motion independent of the locomotive engine.* Application dated November 19, 1853. (No. 2692.)

This invention consists in applying to a truck or carriage in which a guard travels apparatus by which he may cause the axle of the truck or carriage to put in motion a pump or pumps, which compress atmospheric air, and give motion to pistons in cylinders, "and for a time communicate the power of locomotion to the truck or carriage, and thus enable the guard or person to travel quickly back in the event of accident, or otherwise, and also to sound a whistle by the compressed air."

DANIELL, HENRY, of Saint Austell, Cornwall. *Certain improvements in apparatus for drying clay.* Application dated November 19, 1853. (No. 2696.)

The apparatus described by the inventor is enclosed in an outer casing, at one end of which is placed a furnace or fireplace, immediately above which is a chamber, into which air is admitted from the external atmosphere through holes formed in the casing. As the air in this chamber becomes heated, it is expelled by means of a rapidly revolving fan, (which is placed in the chamber for that purpose,) and passes over a shallow pan, in which the clay is placed in a semi-fluid state.

BRAND, RICHARD FARMER, of South-terrace, Willow-walk, Bermondsey, Surrey. *Improvements in fire-arms and ordnance.* Application dated November 19, 1853. (No. 2697.)

This invention consists in securing the barrels of fire-arms and ordnance, as far as practicable, from expansion at the point of ignition of the charge, by causing the ignition to take place in front of an enlarged or strengthened portion of the barrel.

SCOTT, JOHN, junior, of Greenock, Renfrew, North Britain, engineer. *Improvements in steering vessels.* Application dated November 21, 1853. (No. 2699.)

This invention consists in so arranging apparatus, that on turning the steering-wheel, a spur-wheel on its spindle causes two spur wheels alongside of it to rotate each in the same direction, whereby traversing nuts upon screw spindles are made to traverse in reverse directions. This action pulls one connecting-rod and pushes another, and produces a reverse action upon a double lever attached to the rudder, which is thereby turned either to starboard or port, according as the steering-wheel itself is turned.

WIGLESWORTH, HENRY, of Newbury, Berks, bachelor of medicine. *Improvements in pistons.* Application dated November 21, 1853. (No. 2700.)

This invention consists in substituting for the action of the springs employed to force outwards the packing rings of steam engine and other pistons, the pressure of carbonic acid or other gas or vapour contained in a chamber formed for the purpose in the piston.

PARFITT, AARON, of Newbury, Berks. *Improvements in the construction of certain descriptions of vehicles.* Application dated November 21, 1853. (No. 2701.)

This invention, applied to two-wheeled vehicles, consists in rendering them self-adjusting by so constructing them, that the opening of the back panelling or foot-board for the reception of four persons may, through the intervention of certain mechanism, work the body of the vehicle forwards, while the closing of it would return the body to its former position.

LILLIE, SIR JOHN SCOTT, Companion of the Order of the Bath, of South-street, Finsbury, London. *Improvements in apparatus for the production of carburetted hydrogen gas.* (A communication.) Application dated November 21, 1853. (No. 2702.)

The main feature of this invention consists in an arrangement in which each retort is set in an arch, and has direct and separate communications with the furnace, so that by the use of ordinary dampers only the exact number of retorts required are kept heated; and in the event of one of the retorts being worn out or deranged, it can be removed without interfering with the others.

CASHMORE, JOHN, of Bevis-marks, in the city of London, watchmaker. *An improved mode of communicating signals on railways.* Application dated November 21, 1853. (No. 2705.)

The inventor proposes to supply the railway from end to end with a gas main, and at proper intervals of distance to erect gas-burners, which, by means of branches connected with the main, may receive a copious supply of gas, when a signal is required to

be made, but at other times burn with a constant feeble light.

GREAVES, WILLIAM, of Leeds, York, chemist. *An indicator alarum, applicable to railways and railway trains.* Application dated November 22, 1853. (No. 2708.)

This inventor would have placed upon all locomotive engines a separate steam-whistle, to act as an alarm or danger-signal, and connected with this an iron rod or shaft, forming an axis, having a small toothed pinion on its outermost end, working into a vertical rack, terminating in a lever hanging from the locomotive, which lever is to act against an inclined plane that may be lifted up above the rails when a signal is to be communicated.

BAIN, ALEXANDER, of Paddington, Middlesex, engineer. *An improvement in cases for holding cards.* Application dated November 22, 1853. (No. 2709.)

This invention mainly consists in attaching to card cases a spring and a presser in such manner, that when it is desired to take a card from the case, the presser is pushed down a slot in the side of the case, and the point of it catches hold of a card and protrudes part of it, that it may more readily be withdrawn by hand.

MEYER, FREDERICK, of Paradise-street, Lambeth. *Improvements in treating fatty and oily matters, to render them applicable for the manufacture of candles and night-lights.* Application dated November 22, 1853. (No. 2713.)

This invention consists in "converting into acids, by the ordinary saponifying process of stearic acid, manufacturer's palm oil, or other oils, or fatty materials, which are acted on or bleached by chlorine gas, or hydrochloric acid, or bichromate of potash, in combination with an acid, or salt, or with currents of steam, or atmospheric air; such converting into acids being carried on before, or after, or at the time of such bleaching."

MEYER, FREDERICK, of Paradise-street, Lambeth. *Improvements in bleaching oils and fats.* Application dated November 22, 1853. (No. 2715.)

This invention consists in applying manganesic and nitro-sulphuric acid in the bleaching of oils and fats. "Palm, and other oils and fats bleached by such means, are rendered more suitable for the manufacture of soap, candles, night-lights, and for lubricating matters."

STANSBURY, CHARLES FREDERICK, of the firm of Nourse and Co., of Cornhill, London. *An apparatus to be attached to a drill for sowing grain or other seeds for the purpose of mingling guano or other pulverized manure with the grain or seed to be sown, and depositing it in the ground at the same time with the seed, thereby greatly diminishing the quantity of guano or other manure required to produce the best fertilizing effects.* (A communication.) Application dated November 23, 1853. (No. 2721.)

The patentee describes and claims a grinding apparatus for reducing the guano to a fine powder, a distributing apparatus, and a method of sowing grain and guano, or other pulverized manure together, through the same seeding tooth.

AMOS, JOSEPH, of Bristol, Somerset. *Improvements in preparing wood to be employed in the manufacture of casks and other vessels for containing liquids.* Application dated November 23, 1853. (No. 2724.)

This invention applies particularly to American oak, to be used in the manufacture of casks, and consists in extracting the acids from the wood, and thereby rendering it considerably cheaper and superior to the Dantzic or Memel oak generally used in the manufacture of casks.

PROVISIONAL PROTECTIONS.

Dated April 29, 1854.

969. Christopher Kingsford, of Buckingham-street, Strand, Middlesex, civil engineer. Improvements in solidifying or indurating peat, soft, small, or pulverized coal, and other substances of a like oleaginous or bituminous nature, and machinery and apparatus for effecting the same.

Dated May 1, 1854.

972. William Alfred Waddington, of Stonegate, York, pianoforte-maker. Certain improvements in the construction of sounding-boards for pianofortes and other like stringed instruments.

973. William Augustus Archbald, of Stanhope-street, Gloucester-gate, Middlesex, gentleman. Improvements in the manufacture of concrete cane-juice and sugar.

Dated May 8, 1854.

1030. George Thomas, casemaker to Messrs. Nutting, Addison, and Co., of Osnaburg-street, Regent's-park, Middlesex, pianoforte-manufacturers. Improvements in the construction of the framework of upright pianofortes.

1032. Charles Benjamin Normand, of Havre, France, shipbuilder. Improved machinery for sawing wood.

Dated May 11, 1854.

1047. Ezra Miles, of Stoke Hammond, Bucks, civil engineer. An improved coupling joint or connection for tubing or other purposes.

1051. Warren de la Rue, of Bunhill-row, Middlesex. Improvements in distillation.

1053. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improvement in the construction of carriage-wheels, and in the mode of mounting them on their axles. A communication.

Dated May 12, 1854.

1055. John Platt, of Oldham, Lancaster, machinist. Certain improvements in apparatus or machines for forging, drawing, moulding, or forming spindles, rollers, bolts, and various other articles in metal.

1056. Josiah Penton and James Mackay, o Chippenham, Wiltshire, engineers. Certain improvements in the construction of railway wheels and tyres.

1057. William Waite, of Gloucester-street, Regent's-park, Middlesex, gentleman An improvement applicable to the construction of sewers, drains, and pipes, for the conveyance of sewage, water, or gas.

1058. Christopher Nugent Nixon, of Ramsgate, Kent, gentleman. Improved modes of attaching rudders to floating vessels.

1059. Daniel Campbell and James Barlow, of Accrington, Lancaster, machinists. Improvements in looms for weaving.

1060. Thomas Littleton Holt, of Warwick-square, Paternoster-row, London, and William Charlton Forster, of Hatton-garden, Middlesex. Making paper.

1061. Henry Crowley, of Manchester, ironfounder. Improvements in machinery for grinding bones. A communication from Carston Tank Egeberg, of Christiana, Norway.

1062. Moses Poole, of Avenue-road, Regent's-park, Middlesex. Improvements in machinery for splitting leather. A communication.

1063. Charles William Feuillade Aubusson, of Warren-street, Fitzroy-square, Middlesex, gentleman. An improvement in ferrules.

1064. Moses Poole, of the Avenue-road, Regent's-park, Middlesex. Improvements in engraving and printing on glass, and of figuring and ornamenting the same. A communication.

1065. Moses Poole, of the Avenue-road, Regent's-park, Middlesex. Improvements in fire-arms. A communication.

1066. Auguste Edouard Loradoux Bellford, of Castle-street, London. An improved method of retarding the process of decay in flour, meal, grain, and other vegetable substances. A communication.

1067. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in carriage-axles and their boxes. A communication.

1068. William King Westly, of Leeds, York, machinist. An improved construction of railway, and carriages to be employed thereon, applicable chiefly to farm purposes.

1069. Frederick Shand Hemming, of Woodside, Birkenhead, Chester, civil engineer. Improvements in the manufacture of iron houses, part of which improvements is applicable also to the construction of sheds and fences.

1070. Frederick Smith, of York-street, Lambeth, Surrey, oven-builder. An improved arrangement of furnace for consuming smoke.

1071. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improved mode of separating granular substances of different degrees of fineness. A communication.

Dated May 13, 1854.

1073. Jérome André Drieu, of Patricroft, Lancaster, machinist. Certain improvements in machinery or apparatus for cutting fustians, velveteens, and other similar fabrics, to produce a piled surface.

1075. Richard Clarke Burleigh, of Northumberland-street, Charing-cross, Middlesex. Certain improvements in steam engines and other engines worked by the pressure of gaseous or other fluids, which are also applicable to pumps.

1077. Henry Heathcote Russell, of York-buildings, Adelphi, civil engineer. An improved and ready mode of coupling, connecting, or joining.

Dated May 15, 1854.

1079. Joseph Valentin Henry de Ste. Marie, manufacturer, of Paris, France. Certain improvements in the means and apparatus for fixing capsules on bottles, vessels, or flagons.

1080. Louis François Saugrin, of Paris, France, photographist. Improvements in apparatus for the production of stereoscopic and photographic pictures.

1081. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in the manufacture of wheels for railway carriages. A communication.

1082. Richard Scott, of Basford, Nottingham, framesmith, and Thomas Rowland, also of Basford, Nottingham, setter-up and framesmith. Improvements in machinery employed in the manufacture of knitted fabrics.

1083. Paul Prince, of Derby, railway inspector. Retarding railway trains on the approach of danger, and for other purposes.

1084. John Chedgey, of the Grove, Southwark, Surrey, engineer. An improved manufacture of rollers and cylinders, applicable to various kinds of machinery where a smooth, hard, and regular surface is required.

1085. William Edward Newton, of Chancery-lane, Middlesex, civil engineer. Improved machinery for cutting or shaping wood, or other materials. A communication.

Dated May 16, 1854.

1087. Thomas William Miller, of Queen's-place, Southsea, Hants. Improvements in railway-sleepers.

1088. George Edward Dering, of Lockleys, Herts. Improvements in obtaining motive power by electricity.

1089. Anguish Honour Augustus Durant, esq., of Tong Castle, Salop. Improvements in apparatus for sweeping chimneys and flues, and for extinguishing fires therein.

1090. Thomas William Miller, of Queen's-place, Southsea, Hants. Improvements in railway-sleepers.

1091. George Manwaring, of Southampton, Hants, engineer, and William Alltoft Summers, also of Southampton, engineer. Improvements in supplying water for water-closets, for the flushing of drains, and for general purposes.

1092. James Philip Baker, of Chillington Colliery, Wolverhampton, Stafford, mining engineer. Improvements in the construction of railway and other bridges, and in the method of lifting the same after sinking.

Dated May 17, 1854.

1093. William Smith and William Bramwell Hayes, both of Manchester, Lancaster, manufacturers. Certain improvements in power looms for weaving.

1094. Rice Harris and Rice Williams Harris, of Birmingham, Warwick, glass-manufacturers. Improvements in the manufacture of articles in glass.

1095. George Cheadle, of Wolverhampton, Stafford, manufacturer. A new or improved lubricating composition.

1096. Henry Cornforth, of Birmingham, Warwick, manufacturer. An improvement or improvements in shaping and ornamenting metals.

1098. Alfred Vincent Newton, of Chancery-lane, Middlesex, mechanical draughtsman. An improved construction of tenon, and of machinery for forming the same, applicable to the manufacture of boxes for other analogous uses. A communication.

1099. Christopher Catlow, of Clitheroe, Lancaster, overlooker, and Thomas Comstive, of Burnley, shuttle-maker. Improvements in shuttles for weaving.

1100. Squire Diggle, of Radcliffe, Lancaster, machine-maker. Improvements in looms for weaving.

1101. Lionel John Wetherell, of Percival-street, Clerkenwell, Middlesex, civil engineer, and Augustus Johann Hoffstaedt, of Albion-place, Surrey, agent. An improved construction of pump.

Dated May 18, 1854.

1102. William Coulson, of Fetter-lane, York.

Improvements in machinery for mortising and tenoning.

1103. Jonathan Worthington, of Llancaiach and Gilvach Main Collieries, near Cardiff, Wales, gentleman, and Fennell Allman, of Adam-street, Adelphi, London, consulting engineer. Certain improvements in boring, mining, and blasting, and in the apparatus connected therewith.

1104. James Horsfall, of Birmingham, Warwick, manufacturer. An improvement or improvements in the manufacture of wire for pianofortes and other musical instruments.

1105. John Beads, of Pendleton, Lancaster, manager. Improvements in machinery or apparatus for preparing, spinning, doubling, and twisting cotton, woollen, silk, linen, or other yarns.

1107. William Miller, of Musselburgh, Midlothian, starch-manufacturer. Improvements in bleaching flax, hemp, and other fibrous substances.

1108. Oliver Maggs, of Bourton, Dorset. An improvement in applying shafts to agricultural implements and carriages.

1109. James Colley March, of Barnstaple. Improvements in vices.

1110. John Henry Johnson, of Lincoln's-inn-fields, Middlesex, gentleman. Improvements in printing-telegraphs. A communication from Meinrad Theiler.

1111. John Maclean, junior, and Thomas Finlayson, both of Glasgow, Lanark, manufacturers. Improvements in the manufacture or production of ornamental fabrics.

1113. James Curle Robertson, of Glasgow, Lanark, merchant. Improvements in the preparation and roasting of coffee and other substances.

1114. Joseph Hinchliffe, junior, of Dam Side, near Halifax, York, cotton spinner. Certain improvements in apparatus for regulating or governing the speed of steam engines.

1115. Charles Barlow, of Chancery-lane. Improvements in the manufacture of metallic capsules for covering or securing bottles and other vessels. A communication.

1116. John Cunningham, of Liverpool, Lancaster, architect, and William Ashley, of the same place, ship-broker. Improved apparatus for ventilating ships.

1117. Edouard Auguste Désiré Guichard, of Paris, France, designer. Improvements in the manufacture of ornamental fabrics for decorating walls, or other surfaces.

Dated May 19, 1854.

1118. Johann August Haberhauffe, of Grossmuhlingen, Anhalt, Germany, gentleman. Improvements in fire-arms and projectile weapons.

1119. Etienne Jacques Feuillatre, gentleman, of Paris, France. An improved apparatus for cleansing the wheels of carriages.

1120. Peter Armand Lecomte de Fontainemoreau, of South-street, Finsbury, London. Improvements in connecting the permanent rails of railways. A communication.

1121. Thomas Murray Gladstone, of the Irwell Works, Salford, Lancaster, engineer. An improved traverser or machine for shifting railway carriages from one set of rails to another.

1122. Christopher Rands, of the Steam Flour Mills, Shad Thames, Surrey, miller. Certain improvements in machinery for regulating the feed of millstones.

Dated May 22, 1854.

1124. Kosman Rose, of Commercial-road, Stepney, Middlesex, japanner. Improvements in buttons.

1126. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in pianofortes. A communication.

1128. William Crighton, machine-maker, and Andrew Crighton, mechanic, both of Manchester, Lancaster. Improvements in machinery or apparatus, technically called "beaters," used for opening, cleaning, or otherwise preparing cotton, wool, or other fibrous substances.

1130. John Crossley, of Newton-moor, near Hyde, Chester, manager, and William Crossley, of Failsworth, Lancaster, designer and card cutter. Improvements in Jacquard machines.

1132. Robert Anstruther Balbirnie, of Great Malvern, Worcester, gentleman. An improved mode of mounting ships' compasses. (A communication from William A. Orr, of Melbourne, Victoria.)

1134. William England, of Dudley, Worcester, engineer. Improvements in pneumatic and hydraulic wheels and fans.

1136. Henry S. Rogers, of New Oxford-street, Middlesex. Improvements in fire-arms. (A communication from Eli Whitney, of the United States of America.)

1138. Andre Prosper Rochette, of Brighouse, York, soap manufacturer. An improvement in the manufacture of soap.

1140. Robert Oram and William Oram, both of Salford, Lancaster, machinists. Certain improvements in hydraulic presses.

1142. Thomas Storey, of the Phœnix Foundry, Lancaster, engineer. Improvements in stench traps.

Dated May 23, 1854.

1144. Frederick Jenks, of Handsworth, Stafford, manufacturer, and Thomas Brown, of Birmingham, Warwick, manufacturer. An improvement or improvements in saddletrees.

1146. William White, of the firm of White and Son, of Cheapside, London, hat manufacturers. Improvements in hats and in hat blocks.

1148. Ernest Radigon and Raimond Gabriel de Grimouville, both of Paris, France. Certain improvements in glasses, shades, and smoke plates, used in gas and other lighting.

1150. Robert Reyburn, of Baker-street, Greenock. Improvements in refining sugar.

1152. John Lawson, of Sidmouth-street, Gray's-inn-road. Improvements in the manufacture of cut pile fabrics.

1154. James Livesey, of Bury, Lancaster, spinner and manufacturer. Improvements in machinery for preparing or forming slivers of cotton, wool, and other fibrous materials for spinning or other purposes.

1156. Julius Smith, of Henry-place, Bride-street, and Frank Sandom Thomas, of South-terrace, Walworth. Improvements in steering ships and other vessels.

Dated May 24, 1854.

1160. Thomas Ball, of Nottingham. An improvement in manufacturing ornamented looped fabrics.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June 6th,* 1854.)

207. William Partington. An improved construction of safety valve for steam engines.

214. David Chadwick and George Hansom. Improvements in meters for measuring water or other liquids and vapours, or gas.

247. Henry Wickens. Improvements in the mode of intercommunication in railway trains.

256. Alfred Daniel. Improvements in locks and handles for the same.

261. Adolphe Mohler. Certain improvements in apparatus for lubricating machinery.

267. Peter Armand Lecomte de Fontainemo-

reau. Certain improvements in the construction of buildings. A communication.

292. Peter Trumble. Improvements in paper-hangings.

297. Henry Olding. Improvements in stoves and fire-places.

305. Barthelemy Urbain Bianchi. Certain improvements in preventing accidents on railways.

308. John Perry. An improved drilling machine.

336. Gregory Bird. Improvements in the substructures or foundations of buildings.

355. Louis Faure. Improvements in the process of manufacturing iodine.

367. Thomas Jennings. Improvements in stoppers for bottles.

513. Thomas Dawson. Improvements in umbrellas and parasols.

559. Joseph Brown. An improved method of swinging furniture and other articles for travelling by sea or land, and other purposes.

695. John Jeyes. The manufacture of pulp from twitch or couch grass.

845. Edward Lavender. Improvements in apparatus for stirring and acting on matters subjected to heat in retorts.

912. George Jones. Improvements in landing apparatus to be used in working mines.

964. John Evans. A new manufacture of paper.

969. Christopher Kingsford. Improvements in solidifying or indurating peat, soft, small, or pulverized coal, and other substances of a like oleaginous or bituminous nature, and machinery and apparatus for effecting the same.

972. William Alfred Waddington. Certain improvements in the construction of sounding boards for pianofortes and other like stringed instruments.

1004. William Exall. Improvements in machines for cutting straw, and other such materials.

1006. Edwin Haseler. An improvement or improvements in ornamenting metals, papier maché, horn, and shell.

1043. William Williams. An improved propeller.

1051. Warren de la Rue. Improvements in distillation.

1053. Alfred Vincent Newton. An improvement in the construction of carriage wheels, and in the mode of mounting them on their axles. A communication.

1055. John Platt. Certain improvements in apparatus or machines for forging, drawing, moulding, or forming spindles, rollers, bolts, and various other articles in metal.

1056. Josiah Penton and James Mackay. Certain improvements in the construction of railway wheels and tyres.

1062. Moses Poole. Improvements in machinery for splitting leather. A communication.

1064. Moses Poole. Improvements in engraving and printing on glass, and of figuring and ornamenting the same. A communication.

1065. Moses Poole. Improvements in fire-arms. A communication.

1071. Alfred Vincent Newton. An improved mode of separating granular substances of different degrees of fineness. A communication.

1081. Richard Archibald Brooman. Improvements in the manufacture of wheels for railway carriages. A communication.

1084. John Chedgey. An improved manufacture of rollers and cylinders, applicable to various kinds of machinery where a smooth, hard, and regular surface is required.

1085. William Edward Newton. Improved machinery for cutting or shaping wood, or other materials. A communication.

1087. Thomas William Miller. Improvements in railway sleepers.

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1091. George Manwaring and William Alltoft Summers. Improvements in supplying water for water-closets, for the flushing of drains, and for general purposes.

1105. John Beads. Improvements in machinery or apparatus for preparing, spinning, doubling, and twisting cotton, woollen, silk, linen, or other yarns.

1111. John Maclean, jun., and Thomas Finlayson. Improvements in the manufacture or production of ornamental fabrics.

1142. Thomas Storey. Improvements in stench traps.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed June 2, 1854.

2800. James Reilly.
2804. Alexander Brown.
2858. Jean Baptiste Edouard Ruttre.
2862. Andrew Shanks.
2892. Christian Schiele.
2915. Benjamin Whitaker.
2937. Joseph Sharp Bailey.
2986. Jean Daniel Pfeiffer.
3002. John Parkinson.
3027. James Marlor.
3028. Walter Mabon.
3044. François Aristide Clerville.

1854.

22. Edward Schischkar and Frederick Crace Calvert.
114. William Blackett Haigh.
130. Thomas Webb.
139. Auguste Edouard Loradoux Bellford.
290. Andrew Duncan.
624. Antoine Edouard Le Gros.
718. Frédéric Chambon and Alfred Meyniac.
739. Archibald Douglas Brown.
746. John Inshaw and James Parker.
766. James Higgin.
785. Stephen Randoll Smith.
823. Thomas Whitehead.

Sealed June 5, 1854.

2824. John Patterson.

Sealed June 6, 1854.

2829. John Coope Haddan.
2831. Auguste Edouard Loradoux Bellford.
2845. William Bridges Adams.
2846. William Thomas Henley.
2853. James Beall.
2869. John Henry Johnson.
3037. Joseph Holbrey.

1854.

161. Matthew Andrew Muir.

248. Richard Archibald Brooman.
499. John Baptiste Gottung.
691. Herbert Room and William Morton.
694. Samuel Humphreys.
784. Jonathan Harlow.
802. John Henry Johnson.
818. John Henry Johnson.
829. William Worby.
830. William Williams and Thomas Evan Williams.
836. William Wood.
837. William Wood.
851. Uriah Scott.
863. Samuel Brewster Parker.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

Errata.—In last Number, page 515, first column, last line, *for* "C. B. L," *read* "C. B. G." In the woodcut, for *S* read *G*.

Page 516, first column, line 30 from bottom, *for* "not," *read* "now."

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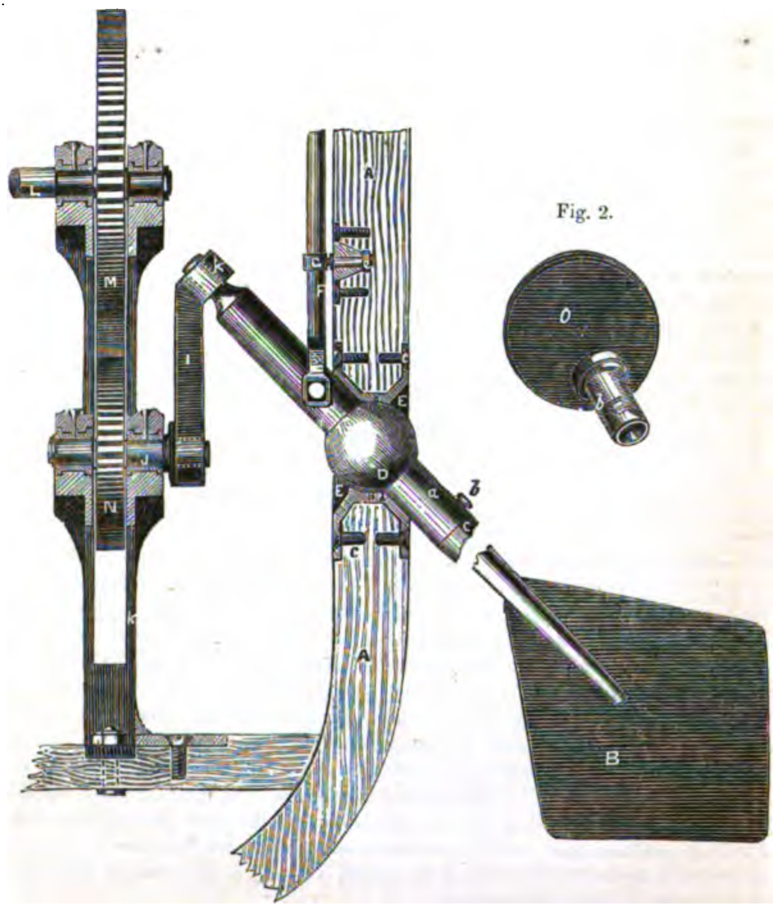
Edited by R. A. Brooman, 166, Fleet-street.

ANDERSON'S PATENT FEATHERING PROPELLERS.

Fig. 1.



ANDERSON'S PATENT FEATHERING PROPELLERS.

(Patent dated September 18, 1858.)

Mr. W. L. Anderson, of Norwood, has invented a method of propelling ships by means of paddles arranged and worked in a manner somewhat similar to that practised in rowing with oars by manual labour. Fig. 1 of the engravings on the preceding page represents one of his paddles fitted to a ship's side, with an arrangement for working it so as to give it a feathering motion. A is the ship's side, shown in section; B the paddle (the form of which may be varied); and C the arm on which it is fixed. The blade or float is made to detach from the arm, as shown at *a*, and is secured to the arm by the screw, *b*, or by any other convenient means. The paddle-arm, C, passes through the ship's side, and is furnished at that point with a ball, D, which works in a socket, E, in a position somewhat lower than that at which a paddle-wheel shaft is usually placed, its movement being similar to that of the well-known ball and socket joint. The socket, E, is formed in two parts, one of which is fitted outside and the other inside the ship's side; they are brought together so as to meet at the point where the ball, D, works in them, and are secured in position by screws, *c c*, which connect them to the woodwork, and by a feather or rib on one of the parts taking into a corresponding groove in the other part, as shown at *d*. Or, instead of bringing the two parts of the socket in contact where the ball works in them, a vacant space or channel may be left between them, and a packing of any suitable material may be placed in the space so left. The paddle-arm, C, has connected to it a rod, F, which passes through an eye formed in the swivel-piece, G, which projects a little from the ship's side, and is capable of turning in its socket, *e*, so as to follow the motion of the rod, F, when the paddle is in operation. The inner extremity of the paddle-arm is carried into or through a socket, H, in the crank-arm, I, in which it is capable of turning freely, the arm of the crank being bent, so as to bring the socket at its extremity in a line with the axis of the paddle-arm. The crank, I, is keyed on the extremity of a transverse shaft, J, which turns in bearings in the frame, K, and receives motion from the main shaft, L (which is driven by steam, hand, or other power), by means of a cog-wheel, M, on this latter, which gears into a cog-pinion, N, on the shaft, J. The arm of the paddle is carried round by the crank, and, while turning in its socket in the crank-arm, it receives such a motion, through the intervention of the guide-rod, F, as causes it to feather the paddle-blade, B, as it emerges from the water. The feathering movement may be varied in direction, as well as in its amount of obliquity, by shifting the position of the swivel-piece, G, through which the guide-rod, F, works, either as regards its distance from the centre of motion at the ball and socket joint, or its position above or below it. The feathering movement may also be produced by other arrangements than that before described, as, for instance, by a pendulous rod passing through a slot in the paddle-arm. The projection of the paddle-arm from the vessel may also be increased or diminished by making it capable of being moved inwards or outwards through the ball, C, and through its point of attachment to the crank-arm, so as to enable the dip of the blade in the water to be altered and accommodated from time to time to the altered line of floatation of the vessel.

In applying these feathering paddles to ships, there might sometimes, if thought necessary, be employed two pairs of them coupled together, so as to enter the water alternately, one pair making the forward stroke while the other is in the water; but a greater number of pairs of paddles may be used, if preferred; and in that case, they should be arranged and worked so as to enter the water in succession, the entry of the whole of them occupying one revolution of the engine-shaft.

The socket-joint in the ship's side is made watertight; but in order to afford additional protection against the admission of water, a circular plate, O, fig. 2, may, if thought necessary, be fitted to a groove in the outer part of the socket, E, so as to come flush with the exterior of the ship's side, the arm of the paddle passing through an orifice in the plate, O, which is also made watertight, and carrying it round in the groove with its own motion.

INDUSTRIAL PATHOLOGY;

OR THE ACCIDENTS AND DISEASES INCIDENT TO INDUSTRIAL OCCUPATIONS.

THE following lecture, which was delivered at the Society of Arts, on Wednesday evening, June 7, by T. K. Chambers, M.D., expounds the objects of the Society in appointing a Committee to institute inquiries into, and collect information concerning the operations of the various processes of the arts and manufactures upon the healths and lives of those engaged in them. We sincerely trust that the Committee will have every possible facility afforded to it throughout the country, in order that it may accomplish great results in so beneficent and important an undertaking.

I come to this room to-day for the purpose of introducing a subject, not indeed wholly new to the Society of Arts, but yet probably new to most of the present members. New, too, is the mode adopted of taking it up, namely, the appointment of a special committee, the undertaking of a special exhibition, and the issue of special circulars and reports upon it. I think, therefore, it cannot be devoid of use, and I hope not of interest either, to explain somewhat at length, *what Industrial Pathology is*, that is, what its aims are in the opinion of those who are taking a part in its promotion; *why the Society of Arts should concern themselves with it;* and *what the Council propose to do in the matter*.

Industrial pathology, then—(I do not particularly admire the name, but I did not make it)—industrial pathology is the "science of bodily sufferings connected with the carrying on of handicraft work."

Man's Creator ordained that he should eat bread in the "sweat of his brow," but he did not ordain that he should eat it in suffering, in the rotting of his vitals, the periling of his soul, and the welcoming of premature death. Though labour is the lot of our species, it is healthy, invigorating labour which is natural to them, and not that which entails misery and pain.

The highest and most natural state of man being the greatest perfection of body and soul, any occupation which tends to shorten his days, to make him a discomfort to himself and his neighbours, is unnatural, and a proof of barbarism and defective civilization. Every country where such occupations exist is lower than it might be in the social scale,—has not yet done its utmost to place man in his proper position as king of the world. As long as he that toils with the hands has a life shorter and more physically painful than he that toils with his brain, the duty of self-improvement is unperformed by a people.

It is not necessary for me to observe that such is the case now in every known nation—that the corporeal labourers are both shorter lived and endure more physical evils than the mental labourers. Statisticians are explicit enough on that point. Now it will be found on enquiry that there are two distinct classes of evils to account for this. In the first class are included poverty, ignorance, political weakness, and other circumstances which prevent handicraftsmen surrounding themselves with the defences against pain and death placed in the power of their superiors. These causes it is the business of political economy, state hygeine, and the science of education to investigate and teach us how to remedy. But there is also a class of causes arising out of the nature of various descriptions of bodily exposure and exertion; pain, sickness, and death accrue from some things necessarily part of the work, without doing which the man could not be industrious at his trade. Here lies the field for industrial pathology. The first class of evils depend mainly on the work not being sufficiently regular or plentiful, or being under-paid, or some such economical mismanagement; the second is aggravated by abundance; the more a man has to do, the worse he fares; and hence the propriety of the term "industrial." I will illustrate this. There are two coal-whippers at a time of a commercial crisis in the coal trade; fewer hands are wanted; one gets turned out of work, and the other is kept on. In six months time the one out of work is starving, because he was so weakened by temporary want of food that he was not fit for employment when he could get it. It is the business of the political economist to remedy commercial crises. The other man has worked as hard as possible in the way you know these fellows are engaged, jumping up a foot or two, and throwing their whole weight on to a rope for ten or twelve hours a day; it is, I believe, the most wasteful, unscientific, and pernicious expenditure of human muscle that ever was devised. The consequence is that his heart cannot stand it, the fibres are overstrained with these continued violent jerks, and the organ becomes diseased. After a tedious illness, during which he is an incumbrance and expense to society, the industrious, well-paid man dies at forty. Here it is that industrial pathology comes into play. It is the duty of that science to find out *why* such and such labour is injurious in a special manner, and to suggest a remedy. For

example, in the instance quoted above, we may find out that it is the sudden jerk which is the cause of the injury to the circulation, and devise some better mechanism than is at present in use.

Again, painters are liable to colic and palsy from the use of white lead; we may introduce a substance equally convenient in the shape of white zinc or other substitutes.

Tailors sit all day in a confined atmosphere, with the legs crossed and the spine bowed, so that neither the ribs nor the digestive organs have room to act. The consequence of course is, that the stomach and bowels become disordered, the spine twisted, the gait shambling, and the power of taking the exercise necessary to health obliterated. If an artist wants to represent a starveling, he takes a tailor as his model; if a plump, rosy man, were to tell you he was a journeyman tailor, you would not allow such an evidently inexperienced workman to mend your coat. With a life embittered by indigestion, what wonder that a tailor takes to opium, gin, and tobacco, the only things that make existence endurable. Now cannot these evils be corrected? The cross-legged position is assumed because, in the ordinary sitting posture, the heavy cloth could not be held near enough to the eye. The problem is to invent some sort of table which would be equally convenient.

Shoemakers and bootmakers suffer equally from a constrained position, and also from the pressure of the last against the stomach. Heartburn and painful digestion are so common, that a certain pill in the Pharmacopeia (the *Pilula Sagapeni Comp.*) is called the coblers' pill. A patient of mine, now in St. Mary's Hospital, has a hollow big enough to put one's fist in, from the pressure inwards of the breast-bone by the boot-tree; of course his lungs and heart are diseased by such distortion. Cannot some one devise a new sort of boot-tree, which will not drive its tap-roots into people's lungs?

Looking-glass makers and water-gilders are constantly coming into hospitals for mercurial paralysis; and when they go out of the hospital they are not fit for much else than the workhouse. There are two ways of remedying this; one is to give them some protection against the poisonous fumes, and the other is to improve and cheapen rival modes of gilding and silvering, in which mercury is not used.

Washerwomen constantly suffer from varicose veins and other mechanical disorders arising from the standing posture. It is the business of industrial pathology to devise a chair in which they could work as at present, or else to discover some mode of doing the same thing by the agency of mechanics, which is now done immediately by the unaided body—to wear out mechanism instead of muscle, iron instead of energy.

I show you here a rotten jaw-bone, which Mr. Simon was obliged to cut out of a man's head, because it was corroded by the noxious fumes evolved in the manufacture of lucifer matches. It is to be hoped that there is some mode of making them without rotting men's jaws, and this mode it is the business of industrial pathology to find out.

Few persons who walk much in the streets can avoid often meeting a bleeding, groaning mass carried by on a stretcher, having just fallen from some ill-made scaffolding. It is the business of industrial pathology to inquire whether it is an essential part of the nature of our countrymen to fall from scaffolding, or whether the construction of it might be so altered as to prevent the accidents. For the encouragement of those who are possessed with the latter idea, it may be cursorily mentioned that in China they have, for several thousand years, used a light bamboo scaffolding, covering the entire building like a network, and certainly preventing the falls which so often happen in Europe. Our ideas seem to have travelled wholly in the direction of making it stronger, heavier, and more unmanageable.

I trust that by these few familiar illustrations I have made clear what industrial pathology is, and how it differs from hygeine. It does not profess to inquire into the health of the industrious classes generally, but only into their health so far as it is affected by their special occupations. It is desirable that this division of labour among scientific observers and teachers should be fully understood, in order that the facts collected should be properly arranged, and handed directly to those who will use them aright. Into the respective utility and consequent dignity of the two sciences, I have not inquired; I only wish to point out which it is that the Council feel themselves called upon to take up.

I now come to the reason *why our Society should particularly give time and attention to the subject*. It may be said that the investigation and cure of disease is not their province, nor universal philanthropy their aim. True, the raising man in the scale of creation, by advancing his arts and manufactures, is our vocation, and a great and glorious one it is; but as he that treats his friends to a banquet is responsible that no poisonous matters are in the dishes, so are we responsible for the boon we are conferring on England in increasing her material powers, to see that there is no evil contained in it, no death in the pot of sweet dainties. It would be a scurvy gift to our country to adorn her with more luxurious raiment, while the threads that compose it are the

fibres, and the dye that makes it glow is the blood of her children.

But is there nobody to take this matter off our hands? Is there no man, or set of men, who, while we are pushing on industry, will see that we do no harm? Really, there is not; it is nobody's business but ours, and nobody has the power of doing it so well and so effectually. I do not deny that Government may, if rightly directed, afford most useful help in this truly great work of perfecting our country, in the same way as they aided us by the countenance given to the Great Exhibition of 1851. But their province and ours are quite distinct, and they could not take our place any more than we could take theirs, without injuring the cause. It is for our rulers to require that certain evils be put a stop to; it is for us to suggest remedies. Parliament does not profess to be an inventive body, nor, except very indirectly, the cause of invention; *but we do*, and in this lies our peculiar aptitude for the task we are now undertaking in earnest. Let us see, as an example of Government interference, how they have lately dealt with one most crying evil,—the excessive number of accidents in factories; and then think how the Society of Arts might perform the same duty. There was a great cry heard last autumn. In the three years ending October 31, 1853, there were 11,716 persons mutilated by machinery, of whom 106 were killed on the spot, and the rest had only arms, fingers, legs, and so on, cut off. This was more than ten times the number of accidents which happened in factories by other causes. While the number of machinery mutilations was, as stated above, 11,716, the other accidents were 1,028. Alarmed at this, the factory inspectors thought it was time to carry out more strictly than had been hitherto done certain provisions in the Factory Act (7th Victoria), which required a perfectly secure boxing or fencing of machinery. They had observed that of these 4,000 annual accidents, of various degrees of severity, at least 40 of the most severe kind occurred from horizontal shafts above seven feet from the ground, and which custom did not require to be guarded like those within reach of a man under ordinary circumstances. Custom did not require it, though the strict letter of the law did. With the hope, then, of reducing somewhat at least these forty annual accidents (which, be it remembered, were not the slighter ones alluded to, but generally fatal), the inspectors sent round a circular, announcing their intention of requiring strict compliance with the enactment, and that all machinery, whatever its height from the floor, should be boxed. They had the opinions of the best engineers that there was no difficulty at all in this being done. Instantly up comes a deputation of members of Parliament, magistrates, and all sorts of respectable persons interested in the profits of manufactories; they besiege the Home-office, and show the "impossibility," that is to say, the great outlay of capital involved in compliance with the law. What was Her Majesty's minister to do? Of course, decide on the evidence before him, countermand the peremptory circular of the inspectors, and take upon himself the responsibility of rendering the law still dormant. A second circular was issued, making various suggestions for the greater security of the machinery, such as putting up hooks to catch lapping-straps, employing only adults in dangerous places, &c., and the test of the effectiveness of these provisions is to be the number of accidents which occur during the current year. But in the mean time not the slightest attempt is made to alter the machinery employed. Suggestions are brought forward to guard the workmen in some degree from its dangerous proximity; but the making the monster itself less fearful is never thought of. This is the object that the Society of Arts would aim at;—we would encourage the invention of less injurious machines and modes of manufacture; we would make them public, and enable the executive to say, "No, gentlemen, our orders are *not* incapable of execution; the way to carry them out is shown at the Society of Arts." It is our business *to lead*; it is the business of Government *to drive*—to drive those who, longer than human patience can bear it, refuse to be led. But the leading must go first, else the driving will be tyranny. We must serve out the straw before we require the tale of the bricks. Whether it will ever be wise of Parliament to forbid many of the noxious modes of handicraft work which I have mentioned, I do not know; but I am sure it would not be wise till the possibility of less injurious modes of attaining the same object can be shown.

I come now to the third question which may be asked concerning Industrial Pathology, viz., *How does the Council propose to be of use in this matter?* This has been, in a great measure, answered by a circular which has lately been issued, and which was printed in the Journal a few weeks ago. They propose, in the first place, to have an exhibition of contrivances and appliances for making the practice of handicrafts more healthy. What they expect to be sent to the exhibition are, in short, means for working with less injury to the body than at present. Machinery of all sorts may appear, the express object of which is to guard

against the myriads of accidents I spoke of, and save lives in numbers to be calculated statistically. Improved hand-tools will be a very valuable department; adzes which will not divide carpenters' shins, boot-trees which will not obliterate coblers' digestions, &c., may be shown to those most interested in using them. Safer ladders, scaffolding, chairs for window-cleaning, buckets for lowering men into wells, mines, &c., will save multitudes of industrious souls, if the invention of them can be stimulated. Another most important path of discovery is the inventing of substitutes for substances chemically noxious, such as lead, quicksilver, phosphorus, arsenic, the strong mineral acids and alkalies; or modes of rendering their noxious qualities harmless; such, for instance, as fixing the putrid fumes of decaying matters preserved for manure or making leather. Another interesting department will be that of guards for the organs of sense of the individual workman—I mean such as will not interfere at all with present modes of manufacture, but will simply defend the artisan from the injuries it entails. As examples, I have placed on the table a few articles referrible to this class, sent to us by Mr. Pillischer, of Bond-street. They consist of defences for the *eyes* against the effect of light and mechanical injury; and if a third of the contrivances that are furnished to us are as simple and rational as these, we shall indeed be fortunate. Improved dresses for particular occupations may furnish another department.

Defences against injury by animals, such as safer harness, dog-muzzles, &c., would prevent many an accident to a domestic servant and working man.

Such are a few examples of the sort of inventions which the Council trust will be sent for exhibition; and, considering the position we hold as the friend—equally and impartially—of master and workman; considering our standing with the public, and our widely-extended connection with the manufacturing classes by means of the Institutes in Union, they have a right to expect many more than they themselves can name or suggest.

I began by saying that the subject of industrial pathology was not new to the Society of Arts; and it is a fact that, during the early part of this century, there was nothing received so much of their attention. Their plan then was to offer premiums for the discovery of definitely fixed desiderata, and among those announced I find no class more numerous than appliances to guard against the injurious effects of trades. Premiums were not only announced, but extensively claimed and bestowed. As an instance of the large scale on which this was done, I will mention the attention given to one limited class, the shoemakers. I find, between the years 1804 and 1817, no less than five mechanical contrivances for enabling shoemakers to work standing, and without pressing on the stomach, were rewarded with premiums and engraved in the "Transactions." I may mention, too, that during the present year, a most ingenious apparatus has been exhibited in this room, by Dr. Stenhouse, for guarding the mouth from chemical fumes, noxious effluvia, and miasmata.* It is a layer of charcoal in a respirator, assisted by which you may inhale air saturated with strong ammonia, sulphuretted hydrogen, chlorine, &c., without harm.

But the giving of premiums and engraving in the "Transactions" does not make these matters sufficiently public to secure them a trial; they cannot be said to have failed, for, I believe, they have not been used by any but the original inventors. Exhibition will afford to the inventor what he values more than premiums and medals, the opening of a market for his goods; in fact, a cheap and strictly honourable mode of advertisement.

I think, too, that an exhibition may be of advantage by connecting this science with that of education. Adult workmen find a difficulty in adopting any new mode of manufacture; they cannot manage new-fangled machines: and, moreover, they can teach their apprentices only in the way they have learned themselves. Now, if into industrial schools improved modes of working could be introduced, more conducive to the health of the artisan, it is clear that a publicity would be given to them which would insure a reception proportioned to their efficiency. As an illustration of this, derived from the same trade I have before mentioned, Mr. Sparks Hall intends to send to the educational exhibition a shoemaking-machine, proposed for use at industrial schools, and which will obviate the evils of the present unwholesome fashion of sitting.

Another means of advancing industrial pathology which has been adopted, is that of inviting from all classes—by means of a general circular—information as to occupations found injurious. This information is intended for the guidance of the Committee and of the Council in their future proceedings.

Thirdly, as a focus of continual advancement, it is proposed also that there should be framed annually, under the superintendence of the Committee a report, as detailed and explicit as circumstances will permit,

* See *Mech. Mag.* for March 4, 1854, page 202.

on some one or more special subject or division of industrial pathology. One year, for instance, they propose to take up "dusty trades," to collect and arrange information concerning the lives and health of millers, grinders, cotton-spinners, &c. Another year, they may investigate the causes of "falls,"—the breaking of ladders, scaffolding, ropes, and so on. This year, as a beginning, they have invited answers to a circular concerning "injuries to the eyes;" and if one may judge from some of the answers already sent in, a most interesting report may be made upon them. I may mention especially, among communications which have come to hand within the last few days, a very full report, from Mr. White Cooper, the well-known ophthalmic surgeon, illustrated with drawings of inventions for defending the eyes; another similar one, containing much additional information, from Mr. Dixon; a paper of statistics from Mr. Hewett, registrar to St. Mary's Hospital; a most interesting paper by a journeyman shoemaker, named Devlin, the suggestions in which are doubly valuable as coming from one who has himself felt the evils; it is on the eye diseases of shoemakers, and I wish I had time to quote some of its original observations. Other working men who have sent answers are glass workers and grinders. We have some valuable matter from Sheffield, about steel grinding. Mr. Cousens, from the north of China, tells us of some habits of Chinese embroideresses, most worthy of imitation. There is a large bundle of others, as yet imperfectly examined, very likely equally valuable; but I think you have here an earnest that the public are ready and willing to make us the mouth-piece of their patriotic communications to one another, and you have heard enough to justify us in proceeding with our plan. We feel sure that the body of information now lying dormant has only to be made public in an energetic and judicious manner, and *acted upon*, to raise the condition of our working classes, and, through them, of our whole country, higher than has ever been deemed possible.

Such, then, are the modes proposed by the Council for helping forward this cause. I do not say others may not be additionally employed; but I do think that from this seed, and with this farming, a crop that will do us credit is to be anticipated.

RAILWAY BRAKES.*

BY MR. W. B. ADAMS.

To put a railway train into motion, requires the expenditure of a considerably greater force than is required to keep up the motion while running; that is, supposing the line to be a level plane without irregular surface. But circumstances might exist in which the force of starting might be less than that required in running. For example, the train might start down an incline, and continue to run up an incline, or along a very rough and uneven road, in which case the initial force might be less than the constant force. Up a steep incline or over a very bad road, it might happen that no initial force or momentum existed in the train, which would be constantly, in horse phrase, "at the collar;" that is, the moment the engine ceased to pull, the train would cease to move.

But a train in very rapid motion presupposes a tolerably good road, in which the initial momentum is not materially absorbed. Where frequent stoppages are required, it is desirable to use considerable speed, in order to make up for the stoppages, and, therefore, considerable momentum has to be absorbed at each stoppage, or previous to the stoppage. To expend the momentum at the stoppage suddenly, would be equivalent to a violent blow, and therefore a retarding process must be resorted to, to expend the momentum gradually previous to the stoppage.

There is one obviously simple means of absorbing the momentum — making the train run up an incline previous to stopping, causing the gravity of the train gradually to expend the momentum, as a runaway horse is stopped by expending his power in running up hill.

But there are many cases in which this would be inconvenient or impracticable, and therefore the practice has obtained of absorbing the momentum by friction. The prevalent rule has been to apply the friction apparently to the wheels, but in reality to cause friction to take place between the wheels and rails. The brakes, first retarding and then stopping the wheels, convert them into a bad kind of sledge with a very small surface, the result being to grind flat places on the surface of the wheels, to drive the rails forward out of their chairs, and to cut away the surfaces of the rails and work out hollows at the rail joints. An examination of the rails near stopping stations, will show the much more rapid wear existing there than on other portions of the line.

The earliest wheel-brakes used on railways were probably of a very simple kind —a piece of timber put through the spokes of the wheels to arrest their revolution, and still used, if the writer be correctly informed, on the Lickey incline, as an im-

* From a chapter in Mr. D. K. Clark's "Railway Machinery."

promptu resource when a wagon without a brake happens to be in the train. This is analogous to the process of tying a rope to the spoke of the wheel of a highway vehicle when the dragshoe is missing. But as loose pieces of timber are awkward and not always at hand, the next step in progress was attained, viz., fastening a heavy iron lever to the side of the wagon, moving on a centre, and with a wood-block fastened to the short end to press on the wheel, when the long end was relieved from its supporting hook, and the weight made to press downwards. This kind of brake may, in one sense, be said to be self-acting, in so far that when once applied, it has no tendency to relieve the pressure on the wheel till the brake-block be worn out, unless the wheel be stopped. It is the form of brake almost exclusively applied to wagons.

The next kind of brake is, in its principle, the same as the foregoing, viz., pressing a block of wood against the wheels, though not in its application. Four wood blocks are suspended by iron hangers from the frame of the carriage, by a transverse shaft connected to thrusting rods, and which revolves by means of a lever at right angles, and a bell-crank, connected with a vertical screw, turned by the guard of the train, the four blocks are forced against the wheels, and if the action of the screw were continued, the blocks might be worn out if the revolution of the wheel were not stopped.

Apart from the evil of grinding flat places on the wheels by stopping them, this brake has another disadvantage. It makes the frame and the wheel a rigid connection, and stops the action of the springs. But this kind of brake has been more used than any other. The means of mechanically applying it have been various.

On the Great Western Railway, where the wheels of some of the six-wheel carriages were very close together, a very simple mode of application was used. A pair of thrusting-bars, one connected to each block, were attached by their centres at an angle of about 45 degrees. A vertical screw, worked immediately above by the guard of the train within the carriage, drew the thrusting-bars to a more obtuse angle, and thus forced the blocks against the wheels. The mechanical action thus obtained was more powerful, but the defect of the connection between the wheels and frame preventing the action of the springs, remained the same as in the former example.

There is a considerable disadvantage in the action of all these brakes, inasmuch as the strain of the resistance to the pressure is thrown upon the axle-bearings, and may tend to force the journal against the cast-iron, and supposing this objection removed, there is a tendency to strain the axle-guards. This probably gave rise to the brakes nipping both sides of the wheel, sometimes called the tender-brake. This is acted on by rods passing over both sides of the wheels, and pulling the blocks against them at each side of the periphery. This brake, like the foregoing, impedes the action of the springs.

With a view to ameliorate the jarring action produced by the application of wood-blocks to the wheels, Mr. Joseph Beattie, about the year 1840, applied a peculiar brake-block, formed of a piece of elastic steel, armed with a surface of plaited hemp, which, taking a gradual bearing, prevented the sudden snatch sometimes taking place with the common wood blocks.

As the friction of a carriage-brake for the purpose of retarding a train depends materially on the weight of the carriage, it was the custom to apply the brakes for the guards of the trains to the first-class carriages, because they were the heaviest. When the elastic action of the springs was stopped by the application of the usual hanging brakes, and the jar was thus communicated to the body, it was of course very annoying to the passengers, and it may be added, that the safety of the wheels on the rails was also lessened by the practice. For this reason, Mr. Nathaniel Worsdell, about the year 1838, turned his attention to the practicability of applying brakes to the wheels, without direct contact with the body. The result of this was the brake known as the "slide brake," consisting of a straight flat bar on each side of the carriage, spanning the axle-boxes, and carrying a pair of wood-blocks, with iron-brackets to slide on the bar. The blocks were operated upon by the screw and lever motion in the usual manner. This brake fulfils the conditions of removing the jar from the body, and also prevents the strain on the axle-guards, but it leaves untouched the difficulty arising from forcing the journals against the bearings, and also that of damaging the tyres by grinding flat places on them.

If we advert to the practice of retarding on highways, we rarely find the practice obtain of converting the wheel itself into a sledge by preventing its revolution. The usual plan is to put a shoe or sledge beneath the wheel, which holds it down, and the friction is thus transferred to the sledge, and the tyre is saved from damage.

A perception of the advantages thus obtained on highways, led to various attempts to imitate the shoe on railways. Mr. Lee obtained a patent for a brake of this kind in the year 1842, consisting of an iron-

block fixed to a lever with its fulcrum on the axle, so as to bring the block under the wheel as required.

It is clear that if this brake were used in front of the wheel, and touching it, the tendency would be for the wheel to run on it if it had space. If it were behind the wheel, a constant pressure must be kept up by the guard. But there would be a considerable disadvantage if used in front. If it descended between the rail and wheel, the effect would be that of a sudden jerk, always dangerous at high speeds on railways. On the highway, the carriage stops to have the drag-shoe put on, and also to have it taken off, but it would not be convenient to stop a railway train to put on or take off brakes.

The principle evidently aimed at in this brake is, by means of an eccentric movement on the axle-box, to cause a large shoe to approach to or recede from the wheel and rail, or both. But the application at the end of a lever is disadvantageous.

A variety of this brake, known as Handley's brake, with double blocks and levers, has been used to some extent.

In the year 1842, Mr. Bodmer patented a brake to bear against the wheels and rails, particularly adapted to a tender, but which, instead of being suspended to the axles as in the cases of Lee's and Handley's brakes, are suspended from the body of the tender, which is six-wheeled, a sledge being placed between each pair of wheels. The sledges, four in number, are provided with flanges similar to those of the wheels, and are some inches shorter than the distance between the wheels. Knuckle-jointed levers were applied between the frame and the sledges, similarly to Gooch's brake, and by straightening these levers by the screw-motion, the sledges are forced down on the rails. There is a mechanical objection to this brake, that it acts by raising the body off the wheels at the same time that it scotches them.

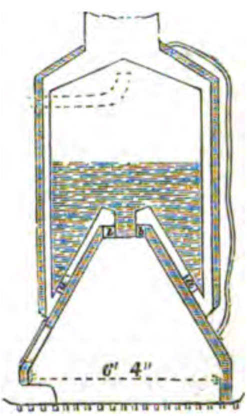
In Gooch's mode of making the body rest on the sledges without the intervention of springs, mischief is done both to the machinery and roadway, and a less steady and less safe friction is induced.

(*To be continued.*)

AMERICAN BEE-HIVE BOILER.

BY T. D. STETSON.

THE steam navigation of the lakes of North America is distinguished by the occasional employment of a form of boiler, locally known by several different appellations, among which the "bee-hive" is, perhaps, the most strikingly descriptive. The accompanying sketch is designed to represent a vertical section through the whole structure, and also through a "water jacket," with which the larger sizes are invariably provided, and which may be considered, in fact, as it certainly is in effect, a part and parcel of the boiler. The boiler proper is in two portions, one above the other, with suitable connections, to allow a free circulation of the contents. A connection is made by a copper pipe leading from the topmost point of the jacket to a position near the base of the main shell, down which the full-heated water and a small modicum of steam is assumed to be continually flowing. This pipe is the only means of communication. The check-valve, not shown in the sketch, is attached to the jacket near its lower rim; and although the vessels are rarely propelled with independent feed-pumps of any description, the arrangement renders it practically certain that this important appendage will remain at all times nearly or quite filled with water. There are four connections, *a a*, located at equidistant points in the horizontal plane. The connections, *b b*, are two in number, and serve



to convey the current of steam and highly-heated water from the lower into the upper shell, while the lower and more liberal passages may be supposed, in some cases at least, to convey a current in an opposite direction. It may be sufficient to know, however, that the deposit, in all cases, settles to the bottom of the lower shell; at which point, as well as at the lower edge of each of the outer portions, ample provision is made for its removal. In the fresh clear water of the lakes these boilers have been uniformly successful; and although difficult of repairs, may very naturally be inferred from the novelty of the form, and the whole might be, for various theoretical considerations, pronounced necessarily short-lived

and troublesome, the experience of the few years it has been in use seems to indicate a rather unlooked-for durability, and the style has won itself a degree of local popularity which might, perhaps, be more widely extended.

The boiler of the propeller *Troy*, from which the sketch is prepared, has been now more than three years in service without any expenditure for repairs.

The *Boston*, a small propeller of some 16-inch cylinder, running between Cleveland and Ogdensburgh, was the first on which this boiler was adopted, and the repairs have, to this day, cost about 25,000 dollars. The whole credit of the experiment is due to Mr. L. Parmalee, a boiler-maker, of Cleveland, by whom most or all of this description yet in use have been constructed. The heating surface is somewhat more efficient than the same extent in any of the usual forms, the actual evaporation being taken as the index. The boiler of the *Troy* presents about 700 square feet of fire surface, and 31½ of grate area. This supplies plenty of very dry steam at a pressure of 80 lbs. above atmosphere, to a cylinder 3 feet 6 inches stroke, and 28 inches diameter, making 55 revolutions per minute, and cutting off at ⅝ths of the stroke from commencement, the throttle being always wide open.

The boiler of the *Troy* having been constructed when the material was quoted at a much lower figure, the cost would be no data for comparison. A boiler now building in this form, and of almost precisely similar dimensions, is to cost 2,250 dollars. The form and proportions allow a very considerable fluctuation in the water-level, without exposing any surfaces to the direct action of the fire; and the large unobstructed water surface allows, what is rarely obtained in upright boilers, tolerably perfect separation of the vapour from the water, the per centage of water mechanically suspended being, for obvious reasons, much less than in any of the ordinary forms. The steam is withdrawn from a point near the apex of the upper shell, the pipe bending down and coming out through the side, as indicated by the dotted lines.

Clothing with felting, or other non-conductors, is a refinement not yet introduced to any considerable extent, either on these or other steam boilers in those localities. Under all the circumstances, with natural draft and ordinary firing with hard wood, the results in several propellers most readily accessible, are as follows, the steam in every case being represented as "plenty" at a pressure of from 68 to 80 lbs.; throttle-valve never used:

The *Niagara*, with a fire surface of 575 square feet, a grate surface of 28·3, and a cylinder 3 feet 6 by 22 inches, makes 56 revolutions, cutting off at ⅝ths.

The *Forest Queen*, fire surface 537, cylinder 3 feet 6 by 28½, makes 56 revolutions, cutting off at ½.

The *Westmoreland* (a fine propeller, 200 feet in length), fire surface 710, grate 44, cylinder 3 feet 6 by 28 inches, makes 58 revolutions, cutting off at ⅝.

The *Prairie State*, *Michigan*, and *Ogdensburgh*, each presenting 700 feet of heating surface, and 38½ feet grate area, with cylinders 3 feet 6 inches stroke, and 22 inches diameter, make from 54 to 60 revolutions, loaded, cutting off respectively at ½, ⅝, and ½ stroke.

The consumption of fuel in the furnaces of these boilers, which are termed "conical vertical," in the Official Reports of the Inspectors, are recorded as follows:

Wood consumption.

Niagara	¾	cord per	hour.
Forest Queen	⅞	"	"
Westmoreland......	1	"	"
Boston	¾	"	"
Prairie State	1	"	"
Michigan	¾	"	"
Ogdensburgh	¾	"	"

There are now floating on the waters of Lake Erie, eleven or more of these boilers. The water spaces adopted are uniformly 4 inches thick around the furnaces. The water jackets are somewhat thinner at the base, diminishing to only about two inches thickness at the top. The iron is ⅜ths of an inch thick for the principal boilers, and ⅛th inch for the jacket, stayed every 5½ inches. Water bottoms can probably be fitted without difficulty, but are not yet much employed, the bottom being usually a simple water-pan, supported on plain bars about 2 inches square.

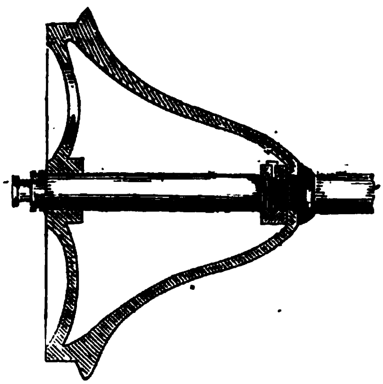
This bottom affords a trifle less direct protection to the keelsons, but gives free access to water in case of accident, and allows a fire to make itself apparent in less time than does a brick bed. The size of the boiler now in use ranges, in external dimensions, from 4 feet 6 inches to 7 feet 4 inches, and in perpendicular height from 10 feet to 17 feet. Its use is unobstructed by patent, or any "intention" to monopolize whatever advantages it may be found to possess.—*Journal of the Franklin Institute.*

MOTT'S RAILWAY-CARRIAGE-WHEELS.

Mr. J. L. Mott, of New York, has obtained a patent in America for an improvement in the wheels of railway carriages.

The accompanying engraving represents a section of a wheel constructed according to this improvement, of which the following description is taken from the *Scientific American:*

"The nature of the invention consists in making railroad wheels with the outer face of any suitable form, and with the central hub fitted to the axle, in combination with the making of the inner plate of a conical or nearly conical form, and with the extremity thereof fitted to the axle towards the middle



of its length. The outer plate gives the required vertical support, whilst the inner conical plate braces it against all lateral thrusts, thus presenting greater strength with a given weight of metal than by any other mode of construction heretofore practised. The rim of the wheel, having its support on the axle toward the middle of its length, by the bracing action of the inner conical plate, will be better stayed to resist lateral thrusts, and this point of support being removed to a greater distance from the plane of the flange, will reduce, if not entirely avoid the breaking or bending of the axle, while at the same time one or both of the wheels can be fitted to the axle so as to turn independently to run on curves, the two points of support on each wheel on the axle being so far apart as effectually to resist the lateral thrusts."

PREVENTING INCRUSTATIONS IN STEAM GENERATORS.

To the Editor of the Mechanics' Magazine.

Sir,—Having occasion to collect all the information I could respecting the prevention of incrustation in steam boilers, I carefully read through the paper which lately appeared in your Magazine on this head. I was very much surprised to see some serious mistakes in the article in question; mistakes, in fact, which render the latter part of it utter nonsense. For instance, it is stated that "101 parts of anhydrous sulphate of lime are decomposed by 78 parts of pure calcined lime." I do not know what philosopher has made this sage discovery; but he is certainly considerably in advance of the age, and would, doubtless, be doing a great favour to chemists in general by explaining what decomposition here takes place, and what are the new products which are formed. Seriously speaking, if a mixture of sulphate of lime and caustic lime were boiled or roasted, or put through any other treatment, together, to all eternity, at the same time *excluding every other body* that could react on either of them, they would, for anything which science at present tells us to the contrary, still remain sulphate of lime and caustic lime; and this is well known to any one who is at all acquainted with chemistry.

Again, a little lower down in the same article, instructions are given to determine when sufficient soda has been added; it says, "A measured quantity is taken from the boiler (filtered if necessary), and divided into two equal parts; a portion of soda is added to one part, and a portion of lime-water to the other. If the former remains clear while the latter becomes slightly agitated, the proportion of soda is correct," &c. Now, although a chemist, I must candidly confess that I cannot see how lime-water can indicate a sufficiency of soda. It is evident that a solution of sulphate of lime has been originally intended; but, by some strange treatment, the words have been metamorphosed into lime-water. But this is not all, for, after telling us that if the solution to which lime-water has been added becomes agitated, the quantity of soda is correct, it immediately contradicts itself; saying, in the last three lines, that "if the water tested with lime-water is agitated, then soda should be removed." This, I presume, means that then there is too much soda present. Query, *how* is the soda to be removed?

It is evident to those who know anything of the character of Fresenius, that such nonsense could not emanate from him. Now, the question is, Mr. Editor, were these blunders in the original French journal, from which the article in question was translated, or are they the work of the translator? Perhaps there is a little of both.

The proper method, and evidently the one originally intended by Fresenius, would be to take two equal bulks of water from the boiler; if muddy, filter. To one add a little caustic soda solution. If a precipitate is produced, it is evident that all the sul-

phate of lime in the water is not decomposed, and more soda must be added to the water in the boiler. To the second portion add some solution of sulphate of lime. If a precipitate is produced, it shows that there is an excess of soda in the water. This can do no harm—it is only the loss of a little soda—but it is better to have a slight excess present, as it could not, by any possibility, be kept at the exact point. I have no doubt that, after a little experience, the quantity of soda to be added could be regulated by the tint given to litmus paper.

I have been induced to take up my pen in this case, seeing that the process is worth a trial; but that, in the form in which it appeared, it was not only incapable of being put into practice, but was contradictory, and in the highest degree unintelligible.

I am, Sir, yours, &c.,

PETER HART.

Manchester, June 9, 1854.

[The principal difficulty with which our correspondent has met arose from the accidental omission of two words in passing the article referred to through the press. The last clause should read thus:—" But if the water tested with the lime-water is *very much* agitated, then soda should be removed." With this exception, the translation is accurately written.—ED. M. M.]

NOISELESS CARRIAGE-SPRING.

MR. NEWNHAM, of Bath, coachbuilder, has lately registered an improved noiseless carriage-spring. Fig. 1 of the accompanying engravings represents a plan of it, fig. 2 a section of one of its ends, showing the manner in which the top and bottom back plates are connected together; and fig. 3 is a transverse section on the line *a b* of fig. 2. A is the top back plate, the ends of which are partially bent round into a circular form, and have welded upon their two sides discs of metal, *c c*, so as to form a box or receptacle for the ends of the bottom back plate, B, the ends of which are also bent round, but have more than sufficient space for passing the centre bolt, C, through. D

Fig. 1.

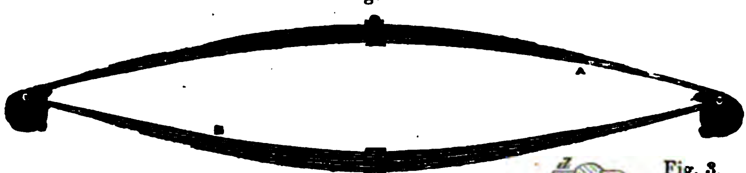


Fig. 2.

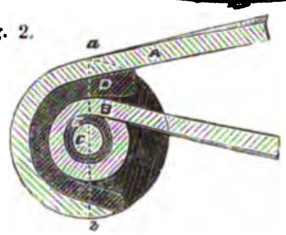
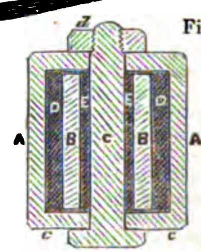


Fig. 3.



and E are two strips of vulcanized India-rubber, or other suitable elastic material, which are interposed respectively between the inside of the top back plate and the outer end of the bottom back plate, and between the bottom back plate and the bolt, C. These elastic pieces are made rather wider than the plates, A and B, in order that they may lap over, as represented in fig. 3, and thus prevent the metal parts from coming in contact. The bolt, C, is retained in its proper position by the screw-nut, *d*. It is anticipated that springs constructed in this way will be more easy, and subjected to less wear and tear than those of the ordinary form.

ON M. DE FERMAT'S GENERAL THEOREM.

IN the letter of our correspondent, " Investigator," on this subject, inserted in our last Number, the exponents of the terms on the left-hand side of the equation were, from

some accidental cause or other, omitted. The equation should, of course, have been

$$x^n \pm y^n = z^n.$$

OPENING OF THE CRYSTAL PALACE.

Our readers will scarcely require us to inform them that the Crystal Palace was inaugurated on Saturday last, with all the pomp and circumstance that befitted an event, the memory of which will be cherished in this land for ages to come, and the influence of which will continue to appear in all the future developments of our national civilization. The anxious discussions that took place at the close of the Exhibition of 1851, concerning the continuance or demolition of the edifice in which

> "Europe and the scatter'd ends
> Of our fierce world had mixt as friends,"

have led to magnificent results. The dispute was ended by the generous determination of a few commercial men to buy the Palace, to transfer it to a more fitting site, and to gather within and around it a profusion of objects calculated to exhilarate, instruct, and exalt their countrymen. They resolved "to attempt the creation of a palace and park which should be at once a fitting ornament of the greatest metropolis of the civilized world, an unrivalled school of art and instrument of education, and a monument worthy of the age and of the British Empire." This attempt of its projectors has been attended with triumphant success. Their work is in the main accomplished, the primate has invoked the Divine favour upon it, and the Sovereign has expressed her hope that the "wonderful structure, and the treasures of art and knowledge which it contains, may long continue to elevate and instruct, as well as to delight and amuse, the minds of all classes" of her people. It now only remains for these, and especially for the inhabitants of this metropolis, to avail themselves of the unparalleled advantages thus presented to them, by discarding meaner sources of gratification, and frequenting the new Palace for purposes of rational recreation and intelligent inquiry. It is our intention to publish, from time to time, descriptions and illustrations of those of the articles exhibited in it, which are of special interest to our readers; but as the mechanical arrangements of the Exhibition are as yet imperfect, we must necessarily defer the execution of this project for a short time.

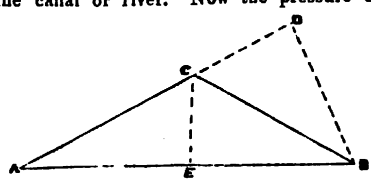
THE FLOODGATE QUESTION.

To the Editor of the Mechanics' Magazine.

Sir,—In your Journal of March 11, I noticed the Floodgate question is again mooted; and as this is one to which I have given much consideration, and upon which I have arrived at conclusions very different from any that I have seen, I waited with much interest for an answer from some of your numerous and more able correspondents; but as no one has hitherto noticed the question, it is not without some diffidence that I now venture to give my views of it, opposed as they are to such very high authorities as those quoted by your correspondent Δ; but seeing that they differ amongst themselves, it is possible that none of them may have taken a correct view of the subject.

In the 3rd volume of Hutton's Course, the question is in substance thus treated:

"Let A C, B C be the two gates meeting in the angle, C; A B being the breadth of the canal or river. Now the pressure of



the water on A C is as the length of it; and the mechanical effect of that pressure is as the length of lever to the middle of A C, or as A C itself. On both these accounts, then, the pressure is as AC^2. Therefore the strength of the gate must be as the reciprocal of AC^2. Now produce A C to meet B D perpendicular to it in D, and draw C E to bisect A B in E, then by similar triangles, A C : A E : A B : A D, where A E and A B being given lengths, A D is reciprocally as A C, or AC^2 reciprocally as AD^2; that is, AD^2 is as the resistance of the gate, A C."

Now, so far I don't dispute; but the author goes on to say, "But the resistance of A C is increased by the pressure of the other gate, in the direction, B C. Now, the force, B C, is resolved into the two, B D, D C, the latter of which being parallel to A C, has no effect upon it; but the former, B D, acts perpendicularly on it, therefore the whole effective strength of the gate is as the product, $AD^2 \times BD$;" and from this he deduces the angle, $A = 35° 16'$.

Now, I cannot see how the strength of A C can possibly be increased by the pressure of B C in the direction of B C, for if (as in the solution) the compression in the direction, A C, be neglected, the two gates

merely act as a mutual support to each other, to enable them to resist the direct pressure of the water; hence it appears to me that this statement, viz., "the strength of A C is increased by the pressure of the other gate," is quite erroneous, and the solution entirely worthless. The question might, perhaps, be simplified without changing the conditions of the problem, by supposing the canal to be only half the width, and closed by only one gate; then the end of A C would merely rest against the opposite wall. Now, if all other considerations but the direct pressure of the water, and the length of the gate be neglected, it is evident that the angle, A, must be the smallest, and, consequently, the length of A C the shortest possible. But it is evident that other considerations must be attended to in the practical solution of this problem. If the gates were shortened till the angle, A, was very small, the compression in the direction, D C, would be enormously increased. It is easy to conceive a case where the gates would be weaker, from this cause alone, than from the other. But the two forces are always acting simultaneously. Now, I cannot see how any one can attempt a mathematical solution of this, without experiments made with beams, under conditions similar to those required by the question. I am not aware that any have been published, or any formula established, adapted for this purpose.

Dr. Hutton's solution is the only one I have access to at present; but I have seen the solutions of Messrs. Wolfenden and Kay, in the *Mathematical Companion*, and a discussion relative to the merits of theirs and that of the Doctor's. I believe a similar fallacy pervades all the solutions that have been hitherto given; if so, they are of no real value, but likely to lead to erroneous constructions.

I am, Sir, yours, &c., C. C.

Holme, June 6, 1854.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

EMPSON, JOHN FIELDING, of Birmingham, Warwick, manufacturer. *Improvements in the manufacture of wire.* Patent dated November 23, 1853. (No. 2722.)

Claim.—Making wire by causing a stream of melted metal to be cooled and solidified as it passes out of a crucible or other vessel.

HILL, JOHN, senior, and JOHN HILL, junior, both of Manchester, machine makers. *Improvements in machinery for winding, doubling, and spinning silk.* Patent dated November 23, 1853. (No. 2723.)

This invention "consists in unwinding silk from cocoons, contained in a trough supported at the back of a machine furnished with a movable carriage as in the machines called mules used in cotton spinning; and in doubling, spinning, and winding the silk obtained from the cocoons, on to spindles supported in a carriage."

DILKS, JAMES, of Parliament-street, Nottingham, lithographer and embosser. *Improvements in bands for binding more effectually than heretofore packets or parcels of lace and other articles.* Patent dated November 23, 1853. (No. 2726.)

Claim.—The combination of cotton, linen, or any other textile fabric with paper, either plain or ornamental, for the manufacture of bands for binding packets or parcels of lace and other articles.

JOHNSON, WILLIAM BECKETT, of Manchester, Lancaster, manager for Messrs. Ormerod and Son, engineers and iron-founders. *Improvements in steam engines.* Patent dated November 23, 1853. (No. 2728.)

Claims.—1. Placing the two cylinders of compound engines in such a position that their centre lines intersect each other at a point above, which point is that occupied by the crank shaft to which they are both connected. 2. Constructing the framing of engines having cylinders placed in the position, before named, of an upright part, to the face of which the cylinders are fixed, and strengthening such framing by extending from its back a rib or ribs downwards to the foundation plate. 3. Placing the slide valves of two steam engine cylinders, situate as before-mentioned, facing each other, or within the space included by the two cylinders. 4. Placing the air-pump between two steam engine cylinders, situate as before-named, and working it direct from the crank-shaft above.

BRADY, JOHN DRUMGOOLE, of Cambridge-terrace, Middlesex, esquire. *An improved mode of, or a new arrangement of straps for slinging knapsacks.* Patent dated November 23, 1853. (No. 2729.)

Claim.—Connecting the shoulder-straps of knapsacks to the slinging or body straps or strap by means of a loop or slide, so as to enable the knapsack, when slung, to preserve its perpendicular position.

KINDER, THOMAS WILLIAM, of Dublin, Ireland, engineer. *Improvements in the construction of the permanent way of railways.* Patent dated November 23, 1853. (No. 2730.)

Claims.—1. A mode of forming hollow rails out of flat plates, wherein the top of the rail is allowed for by a swell or increased thickness of metal rolled thereon, such plate being afterwards rolled, or bent into the required section, by suitable rollers. 2. A mode of securing the chairs to rails, by shrinking or casting them on to the bodies of the rails.

Mason, Hugh, of Ashton-under-Lyne, manufacturer, and John Jones, of Manchester, machine maker. *Improvements in machinery or apparatus for doubling, twisting, and spooling woollen, cotton, and other yarns.* Patent dated November 24, 1853. (No. 2733.)

This invention relates to improvements in machinery or apparatus for doubling and twisting two or more threads and winding them so doubled and twisted on a plain spool in the form of a pin-cop, ready for the weaver, in one process.

Lister, Samuel Cunliffe, of Manningham, York, manufacturer. *Improvements in combing wool, cotton, and other fibrous material.* Patent dated November 24, 1853. (No. 2737.)

The first of these improvements consists in introducing a blade or pressing-instrument to press and hold the fibre more tightly amongst the teeth, and against the head of the comb. And the second, which is applicable when wool, cotton, or fibre has been fed into travelling-combs, consists in mounting rollers with bent or card-teeth on an axis, so that the general system of rollers may revolve in one, and the card or bent-teeth rollers in an opposite direction.

Townsend, Elmer, of Massachusetts, United States. *New and useful improvements in machinery for sewing cloth or other material.* (A communication.) Patent dated November 24, 1853. (No. 2738.)

This invention mainly consists in employing a hook or hook-needle in chain-stitch sewing-machines; and in making the lower part of the needle so as to be capable of springing away from the other part when a set screw is caused to act upon it, thereby adjusting the lower part to the barb, whatever may be the thickness of the needle employed.

Jones, William, of Kilney Cottage, Swansea. *Improvements in the manufacture of bricks.* Patent dated November 24, 1853. (No. 2739.)

In carrying out this invention, a sliding mould-frame is applied below a pug-mill, carrying a mould at each end. Within the mould-frame is a movable pallet, acted on by an eccentric, and a cam for lifting the pallet. When the plastic material has been forced by the pug-mill into the sliding mould-frame, an eccentric moves the mould-frame under the bed-plate, and the other cam lifts the compressing-pallet, and completes the brick. The mould-frame is then moved beyond the bed-plate, which brings the pallet over a cam, or instrument, which lifts it, and delivers the brick, which is removed by hand. During the delivery of the brick at one end of the mould-frame, a similar mould and apparatus is receiving plastic material at the other end of it.

Banks, Daniel Lancaster, of St. James-place, Toxteth-park, Liverpool. *Improvements in rotary engines.* Patent dated November 24, 1853. (No. 2740.)

In each of more than one cylinders the inventor applies a piston, dividing the cylinder horizontally into two equal compartments. This piston is mounted on or carried by axes, which work on rollers placed within the cylinder, and which rotate with the piston.

Montferrier, Alexandre Andre Victor Sarrazin de, of Paris, France, gentleman. *Improvements in wheels for vehicles on common roads and railways.* Patent dated November 25, 1853. (No. 2741.)

The inventor constructs the wheels of two separate parts, one of which "is fixed to the vehicle in the ordinary manner, and moves within the second part, which consists of a circular plate, put in contact with the common road or railroad."

Nichol, Davidson, of Edinburgh, Scotland, stationer. *Improvements in the manufacture of envelopes.* Patent dated November 25, 1853. (No. 2742.)

The object of this invention is to produce economy in the manufacture of envelopes, and it mainly consists in "cutting the exact form of envelope required direct from a continuous web, or from separate sheets of paper, by means of a cutter, the sides of which are so adapted to the required form that the pieces or shapes designed to be formed into envelopes may be cut out of or into each other."

Berry, John, of Manchester, Lancaster, warehouseman. *Improvements in the machinery or apparatus for manufacturing wire fencing.* Patent dated November 25, 1853. (No. 2743.)

This invention consists in manufacturing wire fencing by machinery, worked either by hand, steam, or other power, instead of making it by hand-labour as heretofore.

Calder, William, of Glasgow, Lanark, North Britain, manager. *Improvements in the treatment and finishing of threads or yarns.* Patent dated November 25, 1853. (No. 2744.)

Claims.—1. A mode of treating, finishing, and polishing threads or yarns, wherein they are primarily beamed or wound upon a roller, and then submitted to the action of certain apparatus in the form of a warp. 2. The application and use in thread finishing and polishing machinery of beaters, or reels, made to revolve against the threads disposed in the form of a warp. 3. A mode of first winding off a warp of finished threads upon large bobbins or beams, a convenient number of ends being wound upon each bobbin, and then re-winding the threads off the large bobbins upon smaller bobbins, a

single end being taken up by each of the latter.

BROOK, WILLIAM LEIGH, of Meltham Mills, near Huddersfield, York, cotton-spinner, and CHARLES BROOK, junior, of the same place, cotton-spinner. *Certain improvements in preparing, dressing, finishing, and winding cotton and linen yarns or threads, and in the machinery or apparatus connected therewith.* Patent dated November 25, 1853. (No. 2745.)

This invention mainly consists in an arrangement of machinery by which yarns or threads are caused to pass from a roller, and travel *separately* to the winding-on rollers or finishing-beam, instead of being dressed and finished in the skein or hank.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in carding-engines for carding cotton and other fibrous materials.* (A communication.) Patent dated November 25, 1853. (No. 2747.)

This invention mainly consists in combining certain mechanism which raises and depresses one or more of a series of top-cards of a carding engine with other mechanism, which cleanses the top-cards while they are elevated.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the production of printing surfaces.* (A communication.) Patent dated November 25, 1853. (No. 2748.)

Claims.—1. The production of different tints on printing-cylinders, plates, or cutting rollers by a certain arrangement of lines. 2. A mode of forming the contours of patterns in dots or diagonal lines. 3. A mode of engraving by aquafortis. 4. A mode of increasing the size of a pattern by varying the order of the tints in the repetitions.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *Improvements in rotary engines.* (A communication.) Patent dated November 25, 1853. (No. 2751.)

The patentee describes a rotary engine somewhat similar in form to Davies's, the contour of the piston being produced by the combination of circular arcs and a spiral curve.

GRENIER, CHARLES CALIXTE ANDRÉ, merchant, of Paris, France. *Improvements in the preparation of paints for building and other uses.* Patent dated November 25, 1853. (No. 2752.)

This invention consists in using for painting buildings or other surfaces a solution of resin-lac, and especially that called gum-lac, and other resins, dissolved in a variable quantity of water, or of a solution of carbonate of soda, or other alkali, for the purpose of mixing and fixing the colours.

BARTHELEMY, EMMANUEL, and TONY PETITJEAN, of Upper John-street, Fitzroy-square, Middlesex, mechanists, and JEAN PIERRE BOURQUIN, of Newman-street, Oxford-street, in the same county, merchant. *Improved means of ornamenting glass.* Patent dated November 25, 1853. (No. 2754.)

This invention relates to the method of ornamenting glass by the action of acids. The inventors "first prepare a pattern or design upon any given number of tints or shades of the same colour, and then provide a corresponding number of stopping-out plates or stencil-plates for covering the glass while the ground for resisting the action of the acid is being laid on, and thereby protecting those portions of the glass which are required to be exposed to the acid for receiving the coating or ground."

WORMALD, JOSEPH, of Vauxhall, and GEORGE POLLARD, of York-road, Lambeth. *An improved pipe-wrench.* Patent dated November 26, 1853. (No. 2755.)

This wrench is made adjustable to pipes of different sizes by means of a moveable eye or link, which slides along the neck of the hand-lever, and is fitted with springs and an eccentric tongue, and has also an arrangement for holding the moveable jaw in any required position.

STENSON, JOSEPH, of Northampton, civil engineer and iron manufacturer. *Improvements in the manufacture of iron.* Patent dated November 26, 1853. (No. 2757.)

A full description of this invention was given in our last Number.

GAZAGNAIRE, GEORGES EDOUARD, of Marseilles, France. *Improvements in the manufacture of nets for fishing and other purposes.* Patent dated November 26, 1853. (No. 2758.)

This invention consists in making nets by machinery instead of by hand.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *Certain improvements in straining mill-saws.* (A communication.) Patent dated November 26, 1853. (No. 2761.)

This invention consists in straining saws "by the action of compressed air upon pistons attached to opposite ends of the saw, and working within cylinders; when the said cylinders are so connected with each other, that the compressed air shall alternately pass from one cylinder to the other during the reciprocating action of the saw, and combined with a compressing pump and pressure-valve, for the purpose of maintaining and regulating the intensity of the strain."

CORNIDES, LOUIS, of Trafalgar-square, Charing-cross, Middlesex. *Combining gélatine with other substances, and colouring the same, so as to produce various objects capable*

of resisting atmospheric influences. Patent dated November 26, 1853. (No. 2762.)

In carrying out this invention, the gelatine is combined with collodium or any other suitable transparent varnish, and is first made into the desired form by dipping a model of the object into the gelatine in a liquid state, and then drying the coating which the model takes, and repeating this process until the coating is of the requisite thickness; it is then removed from the model by being cut where necessary, and the parts are then cemented together with gelatine in the form of the required object.

CHAMBERS, THOMAS, and JOHN CHAMBERS, of the Thorncliffe Ironworks, near Sheffield, York. *Certain improvements in kitchen sinks.* Patent dated November 26, 1853. (No. 2763.)

Claim.—The employment of cast iron, or other suitable cast metal, in the manufacture of kitchen sinks.

ROUSSELOT, JOSEPH SCIPION, of Nimes, France, electrician. *An improved application of magneto-electricity for driving machinery, and for neutralizing the impulsive force of machinery in motion.* Patent dated November 26, 1853. (No. 2764.)

This invention mainly consists in a method of "mounting the armatures of permanent magnets on the axles of the running wheels of locomotive engines and carriages, for the purpose of actuating the magnetic apparatus, and obtaining a current of electricity therefrom."

PERODEAUD, JOSEPH MICHEL HENRI, civil engineer, of Rue Godot de Mauroy, Paris, France. *An improved mode of treating peat for the conversion of the same into an artificial coal, which may be used in that state or afterwards reduced to coke.* Patent dated November 26, 1853. (No. 2765.)

In carrying out this invention, the peat is submitted to the action of a pug-mill, which brings it into a state of minute division; and while undergoing this operation, certain chemical solutions are mixed with it, for the purpose of eliminating the metallic and other bodies which it may contain, and leaving the carbon intact.

WALMSLEY, JOHN, of Accrington, Lancaster, manufacturer, and JOHN INGHAM, of Blackburn, same county, mechanic. *Improvements in looms.* Patent dated November 28, 1853. (No. 2767.)

This invention consists in arranging a self-acting apparatus, by which the loom stops or ceases to act when the shuttle stops in the shed or misses boxing; a finger or projection being fixed to the boss of the fly-wheel, so as to come in contact with a lever or levers which act upon the stop-handle.

SOCHET, PRIX CHARLES JEAN BAPTISTE, of Paris, France. *Improvements in obtaining motive power by means of heated gases.* Patent dated November 28, 1853. (No. 2768.)

Among other things, this invention includes the application of metallic wire cloths, superposed in closed chambers, heated at one end and cooled at the other, for obtaining a quick variation of temperature and pressure of air and steam, either alone or mixed together, under the ordinary pressure of the atmosphere or under a higher pressure; the heating of gases, directly or indirectly by means of fire, or by the direct injection of overheated steam or heated gases into the lower part of the wire-cloth chamber; and the cooling the said gases by means of a current of water at a low temperature, acting directly or indirectly by the injection of a small jet of water, or by the successive expulsion and suction of air.

NICHOLLS, ROBERT HAWKINS, of Bedford, gentleman. *Improvements in hoeing and otherwise cultivating land.* Patent dated November 28, 1853. (No. 2769.)

These improvements consist "in giving to implements of culture, or certain parts of them, an independent action, vertical or otherwise, in conjunction with regulating wheels or plates, for the purpose of working and cultivating land by hoeing, paring, skimming, or scarifying, drilling, ploughing, subsoiling, and raking, at an equal and uniform depth from the surface, and also for pressing and rolling land with an equal or uniform pressure."

RAMSDEN, JOHN CARTER, of Bradford, York, stuff-manufacturer. *Improvements in apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.* Patent dated November 28, 1853. (No. 2771.)

This invention mainly consists in a mode of arranging rotary shuttle-boxes, and in the use of a pattern-wheel for selecting the times, the directions, and the extent of the changes that the rotary shuttle-box requires to make in order to produce the necessary pattern.

MACOMIE, ALEXANDER, of Percy-street, Rathbone-place, Middlesex. *An ornamental piece of furniture, shaped like a vase, constructed to contain or form a writing and drawing-desk.* Patent dated November 28, 1853. (No. 2772.)

Claim.—"The adaptation of the forms of vases to the construction of writing-desks."

KELLY, PATRICK, of West-street, Drogheda, printer. *An improved apparatus for cultivating, preparing, and treating land, and for sowing seeds.* Patent dated November 29, 1853. (No. 2775.)

This invention consists of a combination of a locomotive engine, an implement for pulverizing the land, an apparatus for sowing the seed, a roller for rolling the

seed in, and suitable adjusting and driving gear.

HUGHES, EDWARD JOSEPH, of Manchester, Lancaster. *An improved method of purifying and concentrating the colouring matter of madder, munjeet, spent madder, or any preparations thereof, however they may be made.* Patent dated November 29, 1853. (No. 2776.)

This invention is supplementary to a former one patented October 8, 1852, and consists in substituting sulphuric acid for the mixture of acid and water mentioned in the former specification, and in extending the application of the process there described to all preparations of madder, spent madder, or munjeet.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *Improvements in fire-arms.* (A communication.) Patent dated November 29, 1853. (No. 2778.)

The fire-arm described by the patentee is of the same external form as needle-guns, the implements of percussion being hidden in the inside, and acting on some point of the bore of the breech, and the hammer being only used for cocking the gun. The distinguishing feature of the invention is the interposition of a moveable breech between the barrel and the percussion apparatus.

MANNING, JAMES ALEXANDER, of the Inner Temple, Middlesex, esquire. *Improvements in the treatment of sewerage and other polluted liquids, and the products thereof.* Patent dated November 29, 1853. (No. 2780.)

This invention relates to treating sewerage and drainage waters in such manner as to precipitate the solid matters held in suspension in them, the deposit so produced being subsequently treated and applied as a manure, whilst the fluid matter is purified.

JACKSON, JOSHUA, of Wolverhampton, Stafford, manufacturer. *A new or improved signalling apparatus.* Patent dated November 30, 1853. (No. 2781.)

In carrying out this invention, compressed air or other gas is made to sound a railway whistle or other instrument.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE, of Rue de l'Echiquier, Paris, France. *Certain improvements in the construction of the Jacquard machine.* (A communication.) Patent dated November 30, 1853. (No. 2783.)

The patentee describes apparatus by which —firstly, one card is made sufficient for every two shoots,—secondly, the same card, without being withdrawn from its cylinder, will serve to weave seven or eight different kinds of articles,—and thirdly, the same patterns can be reproduced at will upon grounds of different kinds, without the necessity of a new reading. The improved machine does not require any alterations of the various processes preceding the mounting of a Jacquard loom, such as the putting on of ruled paper, and the reading in; nor is the weaving itself altered, but the grab is composed of a double row of moveable bars, the odd and even bars of each row being set in motion by means of a disjointed or double cylinder. The part of this cylinder belonging to the ground harness or shafts, and giving the motion to the bars, turns for every shoot; but the other part of the cylinder, that is, the part belonging to the pattern, strikes twice with the same card, to allow by the first shoot the production of the pattern read on the odd needles, and by the second shoot the production of that read on the even ones.

DAVIS, EDWARD KEATING, of Howley-street, Lambeth, Surrey, metal-pipe manufacturer. *Improvements in machinery for making pipes, sheets, still-worms, and other articles, from that class of metals called soft metals, as lead, tin, zinc, bismuth, or alloys of soft metals that are capable of being forced out of metal receivers or chambers through dies, cores, &c.* Patent dated November 30, 1853. (No. 2784.)

The inventor's claims, which are nine in number, include a certain construction of hydraulic press, the casing of soft metal pipes with block and other metals, the forcing of soft metals into dies by the action of compressed air, a method of plating sheets, a mode of making soft metal sheets, an improvement in metal charging-apertures, the making of dies for coating lead and other pipes with different metals, &c.

HEWITT, JOHN, of Salford, machine-maker. *Certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.* Patent dated November 30, 1853. (No. 2785.)

These improvements relate to self-acting mules, and consist—1. In a method of regulating the diameter of the cop. 2. In a combination of wheels for changing the speed when backing off. 3. In making the pulley on the rim-shaft that drives the spindles when the mule is putting the twist in, give a reverse motion to the spindles when backing off. 4. In giving motion to the nut of the quadrant. 5. In giving motion to the quadrant. And 6. In regulating the chase of the cop, and working the fallers.

BALDERSTONE, RICHARD, of Blackburn, Lancaster, overlooker. *Improvements applicable to spinning-machines known as mules, and to machines of similar character for clearing or cleaning certain parts of such machines.* Patent dated November 30, 1853. (No. 2787.)

Claim.—A method of cleaning or clearing the carriages and roller beams of mule spinning machines, or the corresponding parts of other spinning machines, "by one piece of flannel, or one clearer, whether actuated by hand or self-acting equivalents."

JENNINGS, LEWIS, of Fludyer-street, Westminster, mechanical engineer. *An improved mode of producing plain and ornamental sewing, and in machinery applicable thereto.* Patent dated November 30, 1853. (No. 2790.)

This invention includes, among other features, the employment of a round needle bar with the needle set eccentrically to its axis, for the purpose of facilitating the adjustment of the needle,—a grip motion for actuating the feed-roller,—and a spring presser for holding the string in a state of tension, and preventing it from becoming entangled while the needle is descending.

GARNETT, THOMAS, of Low Moor, near Clitheroe, Lancaster, manufacturer, and DANIEL ADAMSON, of Dukinfield, Chester, engineer. *Improvements in generating steam and in consuming smoke.* Patent dated December 1, 1853. (No. 2793.)

Claim.—Supplying air under pressure, (by means of a fan or other air engine,) and heated by an independent heating apparatus, to the ash-pits or air-chambers of the furnaces or fire-places of steam generators, and at the same time excluding (so far as is practicable,) cold air from such furnaces.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *Improvements in machinery for manufacturing horse-shoes.* (A communication.) Patent dated December 1, 1853. (No. 2794.)

This invention consists of an arrangement of dies, bending arms, and cams, by which horse-shoes of any size may be formed from bar iron.

DILWORTH, JOSEPH, of Preston, Lancaster, engineer. *Improvements in escape-valves and safety-valves.* Patent dated December 1, 1853. (No. 2796.)

This invention consists of an "arrangement of valve for effecting the obtainment of an escape equal to the area of the valve itself. This is accomplished by employing three valves attached to one spindle, the bottom valve of the three being of a smaller diameter than the other two, which are of equal size; these two valves act as equilibrium valves, the steam passing both ways at once."

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in the treatment or manufacture of caoutchouc.* (A communication.) Patent dated December 1, 1853. (No. 2798.)

Claim.—A mode of economising the dissolvents employed in the manufacture or treatment of caoutchouc by condensing the vapours arising from them on inclined plates placed over the heating table, such plates being kept cool by streams of water in combination with some absorbent material.

*** Nos. 2749, 2770, have not yet been allowed. No. 2788 has been opposed at the Great Seal.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

TIMEWELL, JOHN, of Duke-street, St. James, Middlesex, tailor. *Improvements in cutting or shaping materials to be employed in the manufacture of articles of dress.* Application dated November 23, 1853. (No. 2725.)

This invention consists in a mode of shaping the parts of articles of dress, by which the number of seams are reduced.

WILKINS, EDWARD, of Queen's-row, Walworth, Surrey, gentleman. *An improvement or improvements in draining land.* Application dated November 23, 1853. (No. 2727.)

This invention consists in sinking in the land which is to be drained a well or wells into which the water is to drain, in order to be subsequently drawn off.

LOVELL, JAMES, of Glasgow, Lanark, Scotland, gentleman. *Improvements in the application of heat to various useful purposes.* Application dated November 24, 1853. (No. 2731.)

This invention consists in heating the exterior of vessels containing substances which are to be submitted to the processes of infusion, decoction, &c., by inclosing the vessels within a chamber supplied with heated air from a furnace fixed in an external position.

CHALMERS, DAVID, of Manchester, Lancaster, manufacturer. *Improvements in railway breaks and signals.* Application dated November 24, 1853. (No. 2732.)

In carrying out this invention the breaks are thrown into action by releasing a weighted lever, and out of action by means of a chain attached to the lever and passed over a pulley attached to the carriage.

HOLMAN, STEPHEN, of Colney-Hatch, Middlesex, engineer. *An improved construction of double-action pump.* Application dated November 24, 1853. (No. 2734.)

In Mr. Holman's pump the inlet and outlet valves are arranged in pairs, one above the other, in a chamber, one side of which is removable on the withdrawal of screw-bolts which hold the side-plate or cover in its place. The lower valves act alternately as inlet-valves by the ascent and descent of a

plunger, which works in a cylinder, communicating with the valve-chamber.

NEWTON, ALFRED VINCENT, of Chancery-lane, Middlesex, mechanical draughtsman. *A novel construction of apparatus to be used as a chest-expander, and as a uterine or abdominal supporter.* (A communication.) Application dated November 24, 1853. (No. 2735.)

This invention consists of an elastic framing, arranged so as to afford a firm support without obstructing the circulation of the blood, or interfering with any of the vital functions, or movements of the limbs.

RICHARDS, EVAN MATTHEW, of Swansea, Glamorgan, merchant. *Improvements in feed-plates to be used for oxidising lead, and refining silver and lead.* Application dated November 24, 1853. (No. 2736.)

This invention consists in casting the feed-plates hollow, and in passing water continuously through them, by which means the quality of the litharge is to be improved, and a saving effected in the wear of the plate.

DREW, ALEXANDER, of Glasgow, Lanark, North Britain, calico-printer. *Improvements in ornamenting woven fabrics and other surfaces.* Application dated November 25, 1853. (No. 2746.)

This invention consists in forming a sheet material to be used in ornamenting woven fabrics, of a thin film of gutta percha, or other similar substance, overlaid with a thin surface of gold-leaf, the two materials being united together by mechanical pressure and heat.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *Improvements applicable to pens and pencils for writing or drawing.* (A communication.) Application dated November 25, 1853. (No. 2750.)

This invention consists in substituting for the metal fittings, which are generally used for uniting metallic pens to penholders, a fitting of pure caoutchouc, or of caoutchouc mixed with other substances.

WILKINSON, ENOCH, and WILLIAM RYE, both of Oldham, Lancaster. *Improvements in power looms.* Application dated November 25, 1853. (No. 2753.)

This invention mainly relates to an arrangement for giving motion to the cloth roller "by means of the connecting-rod of an eccentric placed upon the tappet-shaft of the loom, which rod gives a vibratory motion to a pendant slotted lever, to which are attached catches, which give a rotatory motion to a ratchet-wheel, which motion is transmitted to the cloth roller through a pair of bevel wheels, and a worm and wheel. This arrangement gives a uniform velocity to the cloth roller."

MOAT, WILLIAM CROFTON, of the Strand, Westminster, member of the Royal College of Surgeons, England. *An improved truss.* Application dated November 26, 1853. (No. 2756.)

This truss consists of an elliptical bar of spring steel, upon which slides a runner that carries a plain piece of tempered steel, set at an angle to the bar, so as to press inwards when on the body. The degree of pressure is regulated by the size of a pad which is carried at the end of the plain steel piece.

COUTTE, HIPPOLYTE, and JEAN MICHEL HAMMERBACHER, of Paris, France. *An improved machine for washing linen and other textile articles.* Application dated November 26, 1853. (No. 2759.)

In carrying out this invention, a star-wheel is placed within a metallic cylinder, contained in a vessel that holds the water, &c.; and by a handle and suitable gearing the star-wheel and vessel are made to revolve in one whilst the cylinder rotates in the opposite direction.

ROTH, JULES, and HENRI DANNER, of Mulhouse, France. *An improvement in cards for carding.* Application dated November 26, 1853. (No. 2760.)

This invention consists in forming the body of cards of a vegetable substance, such as cotton, or of an animal substance, such as wool, in the form of tissues, and in then covering them with a certain described mastic or varnish.

PRITCHARD, WILLIAM, of Clerkenwell, Middlesex, cabinet-maker. *Improvements in buffers for diminishing the shock in the collision of railway trains.* Application dated November 28, 1853. (No. 2766.)

This invention consists in an arrangement of spring buffers connected to the framing of the rear carriage of a train.

LORD, JAMES, of Farnworth, Lancaster, manager. *Improvements in the manufacture of certain articles for ladies' under-clothing, and in fabrics for the same.* Application dated November 28, 1853. (No. 2773.)

This invention consists primarily in certain methods of producing petticoats, &c., for ladies. According to one of these, the inventor so arranges the warp-threads of a loom, and imparts such shedding to them that ornamental devices or stripes are produced in the direction of the selvage of the cloth. A sufficient length of the fabric is then cut off and united at the ends, by which means a petticoat is formed with stripes or devices, and the warp-threads around the body of it.

HURRELL, SAMUEL, of New North-street, Middlesex, smith. *Improved machinery for measuring and winding or rolling fabrics.* Application dated November 28, 1853. (No. 2774.)

In carrying out this invention, an iron spindle is passed through the centre of the roll of goods to be measured, and the roll is placed in suitable bearings in the machine; the end of the piece is then passed over and under or between certain carrying-rollers, which turn loosely on centres, and is subsequently passed over a measuring-cylinder, which indicates the quantity by the number of its revolutions.

MOORE, JOSEPH, of Lincoln, gentleman. *An improvement in or addition to ploughs.* Application dated November 29, 1853. (No. 2779.)

The inventor proposes to attach to the plough a wooden or iron drum to travel immediately after the share, and to serve as a substitute for the sole now in use. He also proposes to fix to the beam of the plough a similar drum, having iron spikes or teeth on the outer circumference of it.

ELCE, JOHN, of Manchester, machine-maker. *Certain improvements in machinery for spinning.* Application dated November 30, 1853. (No. 2782.)

These improvements consist of a new combination of parts for regulating the winding on motion from the bare spindle till the bottom of the cop is formed. To the under faller shaft is fixed a lever with a stud and bowl, which bears upon a swivel-rail supported in bearings attached to the head-stock, and the swivel-rail is provided with a counter-weight.

REDFORD, JOSEPH, of Pilkington, near Manchester, Lancaster, weaver. *Certain improvements in power-looms.* Application dated November 30, 1853. (No. 2786.)

This invention relates to those looms only wherein two or more shuttles are used, and consists of a revolving-drum (placed in any convenient part, and actuated by any convenient motion of the loom), having a series of moveable tappets or keys sliding in longitudinal grooves either from or towards the centre, and placed on the exterior surface of the drum.

LOUBAT, ALPHONSE, of Paris, France, gentleman. *Improvements in the construction of tramways.* Application dated November 30, 1853. (No. 2789.)

This invention consists in the application to ordinary roads of a rail having a grooved upper surface. This rail is intended to serve as a tramway for wagons and other vehicles, and is set in the road so as not to project above the surface.

LANDTSHEER, NORBERT DE, of Ghent, Belgium. *Improvements in machinery for combing flax or other fibrous material.* Application dated November 30, 1853. (No. 2791.)

This invention mainly consists in placing combs on five or more drums or cylinders, which revolve on separate axes, each revolving independently of the others, and the adjacent ones in opposite directions, by which means the flax is combed on both sides simultaneously. These drums or cylinders revolve at different speeds, and the combs upon them are graduated from coarse to fine.

COLE, FRANCIS SEWELL, of Childown, Surrey. *A smoke-consuming apparatus for enabling every fire to consume its own smoke.* Application dated November 30, 1853. (No. 2792.)

This invention consists in connecting to fire-places an iron pipe or series of pipes, which passes from the entrance of the chimney down below, and then up through the fire, returning ultimately to the chimney. When this pipe or series of pipes becomes red-hot, the smoke, passing through it, will be consumed.

PROVISIONAL PROTECTIONS.

Dated February 20, 1854.

406. William Melville, of Roebank Works, Lochwinnoch, Renfrew, printer. Improvements in printing textile fabrics and other surfaces.

Dated February 24, 1854.

450. William Macnab, of Greenock, Renfrew, engineer. Improvements in steam engines of the class usually termed trunk engines.

Dated March 6, 1854.

536. Andrew Barclay, of Kilmarnock, Ayr, engineer. Improvements in condensing steam-engines.

Dated March 20, 1854.

658. Claude Adrien Bernard Chenot, of Paris, Boulevart St. Martin, France. Improvements in the manufacture of steel, iron, and different alloys, cast, welded, and moulded.

Dated April 1, 1854.

748. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in breech-loading fire-arms. A communication.

Dated May 6, 1854.

1020. Ralph Bulkley, of New York, United States of America. The extinguishment of fires in steamers, vessels, houses, and buildings of all descriptions.

Dated May 8, 1854.

1026. Carl Pfersdorff, of South-row, Kensall New Town. A new toy or ærial top.

Dated May 22, 1854.

1123. Thomas Alletson, of Moorgate-street, London, gentleman. Improvements in the construction of flues and chimnies for steam-engine boiler furnaces and other furnaces.

1125. Auguste Edouard Loradoux Bellford, of Castle-street, London. Certain improvements in looms for weaving. A communication.

1127. William Church, of Birmingham, Warwick, engineer. A new or improved projectile.

1129. Robert Crosland and William Holiday, of Bradford, York, engineers, and John Heaton, of the same place, foreman moulder to the said Ro-

bert Crosland and William Holiday. Improvements in apparatus employed in the manufacture of cast metal pipes or tubes.

1131. John Blake, of Greenock, Renfrew, engineer. An improved shackle-hook.

1135. Louis Sautter, of Paris, engineer. Improvements in lighthouses, and in lamps for lighthouses and other places.

1137. Frederick Clark, of King-street, Whitehall. An improvement in fixing the spindles of door and other knobs and handles.

1139. Joseph Blakey Spencer, of the Shooter's-hill-road, Kidbrook, Kent, and Arthur James Melhuish, of Bowater-place, Greenwich. Improvements in photographic apparatus.

1141. Charles Bostock, of Manchester, Lancaster, manager, and Stephen Greenwood, of the same place, spindle-maker. Certain improvements in machinery or apparatus for cleaning and doubling silk.

Dated May 23, 1854.

1143. Thomas William Atlee and George Jobson Atlee, of Birmingham, Warwick, factors and manufacturers. Improvements in printed or other forms, applicable for bankers' cheques, orders for goods, wharfingers' and carriers' receipts, taxes and rates collectors' receipts, and various other parochial, commercial, or private purposes, whether such forms be bound up into books or not.

1145. John Biggs, civil engineer, of Ightham. An improvement in the mariners' and other compasses by isolating and rendering them insensible to the disturbing influence of local attraction of iron, steel, and other bodies.

1149. Joseph Kuczynski, of Rue de Rivoli, Paris, France. Improvements in preparing baryta and its salts.

1151. Charles Levey, of Little Queen-street, Lincoln's-inn-fields, Middlesex, machinist. Improvements in weaving bags and other tubular fabrics.

Dated May 24, 1854.

1157. Frederick Lipscombe, of the Strand, Middlesex, water-filter manufacturer. Improvements in guiding ships and boats.

1159. Thomas Clarendon, of Dublin, gentleman, and Owen John Gilsen, of the same city, carpenter. Improvements in the means or apparatus for working breaks on railway carriages.

1161. Josiah George Jennings, of Great Charlotte-street, Blackfriars, and Robert Davenport, of Jonathan-street, Vauxhall. Improvements in the construction of kilns for burning pottery and other ware.

Dated May 25, 1854.

1162. Edward Onslow Aston and George Germaine, both of Millwall, Middlesex, master mariners. Improvements in mariners' compasses to counteract the effect of local attraction.

1163. Jean Marie Chevron, of Paris, France, civil engineer, and Charles Victor Frederic de Roulet, of the same place. Improvements in textile fabrics, and in machinery for manufacturing such fabrics.

1164. Joseph Harrison, of Fitzroy-square, Middlesex. Improvements in pianofortes.

1165. Edward Everall, of Henrietta-street, Brunswick-square, Middlesex, gentleman, and Thomas Jones, of the same place, chemist. Waterproofing all kinds of cloth, clothing, silk, and leather, without injury to their respiratory properties, flexibility of fabric, colour, or appearance.

1166. Edouard Cari Mantrand, of Paris, France, chemist. Improvements in the manufacture of phosphorus.

1167. Louis Michel François Doyere, of Paris, France, professor of natural history. Improvements in purifying grain.

1168. John William Jeakes, of Great Russell-street, Middlesex, engineer. An improved construction of stove-grate.

1169. John Packham, of Western-road, Brighton. Improvements in boilers used for heating and circulating water.

1170. John McGaffin, of Liverpool, Lancaster, engineer. Improvements in metal casks and tanks.

Dated May 26, 1854.

1171. Allan Livingston, Jun., of Portobello, Midlothian, Scotland, brick-manufacturer. Improvements in earthenware pipes for drains and sewers.

1172. Joseph Albert Corwin, of Newark, New Jersey, United States of America, gentleman. Improvements in knitting-machinery.

1173. Gardner Chilson, of Boston, Massachusetts, United States of America. A new or improved furnace or heat generator and radiator, to be used for warming buildings or apartments, or for various other useful purposes.

1174. Samuel Sweetser, of Massachusetts, United States of America. An improvement in preparing skins or hides for the application of tannin thereto, or for being tanned. A communication from Warren A. Simonds, of Massachusetts.

1175. Mahlon Loomis, of Massachusetts, United States of America. An improvement in the manufacture of artificial teeth.

1176. William Gossage, of Widnes, Lancaster, chemist. Improvements in smelting or reducing copper ores, and certain other metallic compounds.

Dated May 27, 1854.

1178. Henry Distin, of Cranbourne-street, Leicester-square, Middlesex, musical-instrument manufacturer. Improvements in drums for musical purposes, and in the mode of supporting and keeping them in the required position when in use. A communication.

1179. Julius Schmoock, of Oxford-street, Middlesex, carpenter. Improvements in the construction of children's and other carriages moved by manual power.

1180. Joseph Hipkiss, of Dudley Port, Stafford, ironmaster. An improvement or improvements in puddling-furnaces used in the manufacture of iron.

1181. James Murdoch, of Staple-inn, Middlesex. Improvements in toy pistols. A communication.

1182. William Stenson, Jun., of Whitwick Collieries, near Ashby-de-la-Zouch, Leicestershire, mining engineer. Improvements in steam-engine valves.

Dated May 29, 1854.

1184. Thomas Bazley, of Manchester, Lancaster, cotton-spinner. Improvements in and applicable to furnaces and vessels used in connection therewith for the manufacture of glass.

1186. John Evans, of Abbots Langley, Hertford, paper-manufacturer. Improvements in the manufacture of ornamental paper and paper bands.

1188. Thomas Taylor, of Eddingley, Nottingham, agricultural-implement manufacturer. Improvements in machinery or apparatus for distributing manure and vegetable substances.

Dated May 30, 1854.

1192. Francis Mordan, of Frederick-place, Goswell-street-road, Middlesex. An improved inkstand. A communication.

1196. Henry Doulton, of High-street, Lambeth. An improvement in the manufacture of junctions for sewers and drains.

1198. Lewis Stirling Middleton, of Glasgow, Lanark, manufacturer. Improvements in the manufacture or production of ornamental fabrics.

1200. Hall Colby, of New York, United States of America. Improvements in instruments for taking altitudes, levels, and angles, which he designates "Colby's Altimeter," or self-adjusting quadrant or sextant.

Dated May 31, 1854.

1202. John MacFarlane, of Renfrew, manager. Improvements in steam boilers.

1204. John Kent, of St. James-square, Notting-hill, Middlesex, gentleman. Improvements in harbour and river boats and other floating vessels, also in paddle-box boats.

1206. William Edward Wiley, of Birmingham, Warwick, gold-pen manufacturer, and Edward Lavender, of Birmingham, gold-pen manufacturer. Improvements in the manufacture of certain kinds of metallic pens.

1208. Charles Claude Etienne Minié, of Paris, France. Improvements in projectiles.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

1257. Nehemiah Brough, of Birmingham, Warwick, machinist. Improvements in the manufacture of buttons, and in attaching them to articles of wearing apparel. June 6, 1854.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June 13th,* 1854.)

255. John Jobson and Robert Jobson. Improvements in the manufacture of moulds for casting metals.

258. John Dewar Morrison. Improvements in winches.

266. Frederic Henry Sykes. An improved apparatus for supplying or feeding boilers with water, applicable to raising and forcing liquids for other purposes.

273. William Longmaid and John Longmaid. Improvements in the manufacture of vegetable charcoal.

283. Thomas Sullivan. Certain improvements in rollers and moulds used in making paper.

287. Auguste Louis Nicolas Comte Vander Meere. The manufacture of artificial whalebone, or a substance capable of being employed as a substitute for whalebone and tortoiseshell. A communication.

309. John Ramsbottom. An improved hoist for raising and lowering railway rolling stock and other articles.

340. Jacques François Dupent de Bussac. Certain improvements in paving and covering places.

346. Edmund Clegg and Edmund Leach. Improvements in slubbing, spinning, drawing, twisting, doubling, and winding wool, cotton, silk, flax, and other fibrous substances.

358. Samuel Perkes. Improvements in valve-cocks. A communication.

362. John Hossell. Improvements in machinery or apparatus for washing, scouring, and squeezing leather, or other similar substances.

394. Bashley Britten. Improvements in crushing, pulverising, and washing mineral earths or ores, and amalgamating the gold and silver contained therein, which said improvements are also applicable to crushing and pulverizing other substances.

408. John Ramsbottom. Improvements in welding.

418. John Henry Johnson. Improvements in machinery for making matches. A communication from Edward Zulzer, of New York, United States of America.

450. William Macnab. Improvements in steam engines of the class usually termed trunk engines.

465. Auguste Edouard Loradoux Bellford. Certain improvements in machinery for dressing stone. A communication.

476. John Morrell. Stopping the tap of any vessel containing oil, treacle, or any other liquid, as soon as the quantity required of such oil, treacle, or other liquid has been taken therefrom, such quantity being ascertained by weight.

504. Thomas Truscott and Thomas Palmer Baker. An improved arrangement of steam engines adapted to screw propulsion.

960. Joseph Barling. Improvements in treating the hop bine, and rendering it applicable to the manufacture of paper and other articles.

1001. James Nasmyth. An improvement in the process of puddling iron.

1082. Richard Scott and Thomas Rowland. Improvements in machinery employed in the manufacture of knitted fabrics.

1103. Jonathan Worthington and Fennell Allman. Certain improvements in boring, mining, and blasting, and in the apparatus connected therewith.

1104. James Horsfall. An improvement or improvements in the manufacture of wire for pianofortes and other musical instruments.

1109. James Colley March. Improvements in vices.

1116. John Cunningham and William Ashley. Improved apparatus for ventilating ships.

1117. Edouard Auguste Désiré Guichard. Improvements in the manufacture of ornamental fabrics for decorating walls or other surfaces.

1118. Johann August Haberhauffe. Improvements in fire-arms and projectile weapons.

1129. Robert Crosland, William Holliday, and John Heaton. Improvements in apparatus employed in the manufacture of cast metal pipes or tubes.

1138. Andre Prosper Rochette. An improvement in the manufacture of soap.

1140. Robert Oram and William Oram. Certain improvements in hydraulic presses.

1157. Frederick Lipscombe. Improvements in guiding ships and boats.

1171. Allan Livingston, Jun. Improvements in earthenware pipes for drains and sewers.

1173. Gardner Chilson. A new or improved furnace or heat generator and radiator, to be used for warming buildings or apartments, or for various other useful purposes.

1174. Samuel Sweetser. An improvement in preparing skins or hides for the application of tannin thereto, or for being tanned. A communication from Warren A. Simonds, of Massachusetts.

1175. Mahlon Loomis. An improvement in the manufacture of artificial teeth.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the *Gazette* in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

WEEKLY LIST OF PATENTS.

Sealed June 9, 1854.

2861. Duncan Christie and John Cullen.
2865. Richard Eccles, John Mason, and Leonard Kaberry.
2866. James Sutcliffe.
2881. John Henry Johnson.
2883. Nicolas Victor Guibert.
2895. Philip Grant.
2897. John Ambrose Coffey.

2938. Joshua Horton.
2988. Joseph Gaultier.

1854.

250. John Burgum.
580. William Mill.

Sealed June 13, 1854.

2890. James Wansbrough.
2904. William Beckett Johnson.
2939. George Anderson.
229. Robert Chapman.
284. Dominiques Deyres.
323. Samuel Hunt and Thomas Morris.
325. Benjamin Hornbuckle Hine, Anthony John Mundella, and Luke Barton.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned therein.

NOTICES TO CORRESPONDENTS.

R. Holden.—The end you propose to effect by your invention, it is very desirable to accomplish. If your apparatus is simple and good, we should decidedly recommend you to bring it forward.

T. S.—The fibres of only the young green shoots of the bamboo have, we believe, been applied to the manufacture of paper.

C. Wells.—The term "lifting-gear" is commonly applied only to the apparatus by which safety-valves are lifted from within the boiler.

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BATES' PATENT MACHINERY FOR STAMPING AND CUTTING METALS

Fig. 2.

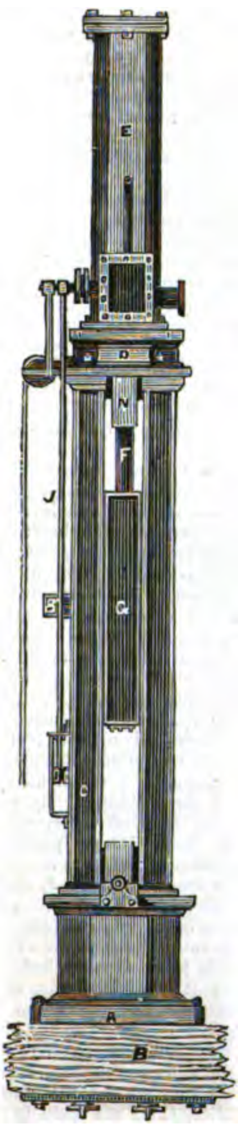
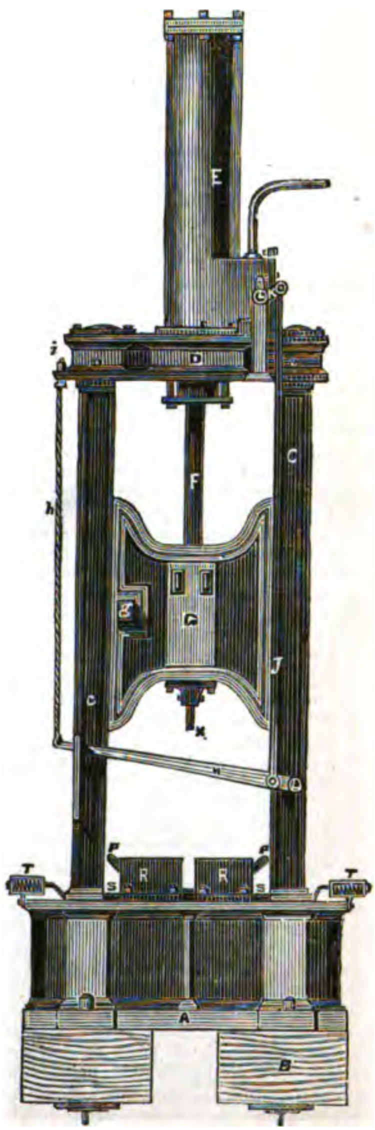


Fig. 1.



BATES' PATENT MACHINERY FOR STAMPING AND CUTTING METALS.

(Patent dated December 7, 1852.)

MR. L. H. BATES, of Bradford, has patented a very effective arrangement of machinery for stamping and cutting metal nuts, and other similar metal articles. In constructing his machinery he fixes a bed or table on which are arranged two or more dies, face to face, each face being formed to correspond to one half the exterior shape of the article to be produced, so that when the dies are brought together a space may be left between them, or between every two of them, exactly corresponding to that shape. He mounts the dies so that they may be capable of motion towards or from each other in suitable guides or grooves, and applies to each of them a spring or other contrivance, by which they may be kept constantly apart from each other, except when brought forcibly in contact by the means about to be described. Each side or edge of each of the dies is formed with an angular or cutting edge, so that when these edges are brought together they may sever that part of a bar of metal from which the nut or article is to be formed, and which will at that time be between the dies. Immediately over the space between the dies when in contact is mounted in suitable guides, so as to be capable of motion upwards and downwards, a punch or stamping instrument, by which the piercing of the hole in the centre of the nut, which is to be afterwards cut with a screw thread, is entirely or partially effected. This punch or stamping instrument is weighted to the extent necessary to enable it to perform effectually its intended purpose. For the purpose of bringing the dies forcibly together, so as to form the nut or other article at the same time that the aperture through or partially through it is produced, the inventor employs the percussive force due to the descent of the punch or stamping instrument. To enable this force to act on the dies, he applies to each die a lever projecting therefrom, at an angle of upward inclination between the vertical and horizontal, and uses springs to retain the levers in such position to enable them to be more effectually acted on by the falling weighted stamp. To this stamp is attached, on each side, curved or inclined surfaces which, when the stamp is caused to descend, act against the levers on the dies and force the dies together, so as to compress the metal into the form of the nut, and sever the nut from the bar at the same time that the central aperture is formed, as before explained.

Figure 1 of the accompanying engravings represents a front elevation of a machine constructed according to this invention; figure 2 is a side elevation of it; figure 3, a front sectional elevation of the punch-block and punches, and the dies and levers supported on the bed of the machine; figure 4, a sectional plan of the dies, die-blocks, and guides in which they move; and figure 5, a front sectional elevation of the entablature or upper part of the framing, showing the piston-rod and stuffing-box of the steam cylinder for raising the punch, and the timber-stops which act as buffers to the punch-block in its upward motion, the length of the stops being regulated according to the force of the required blow. A A is the base or bed of the machine, and B B are the beams of wood on which it rests; C C are the columns, and D the entablature of the framing: E is the steam cylinder for raising the punch-block, and F its piston-rod, which is connected directly to the punch-block, G, H is a lever, the fulcrum of which is at I, on one of the columns, C; and J is a rod connected to that lever and also to the lever K, which is fixed on the valve-spindle, L. The free end of the lever, H, has attached to it a rope, *h*, which passes over a pulley, *i*, supported in brackets on the entablature, D, the other end of the rope hanging down to a sufficient distance to enable it to be taken hold of by the attendant on the machine. By pulling this rope downwards, the steam valve is worked so as to shut off the steam and open the exhaust port, when the punch-block immediately falls. In the punch-block, G, is fixed a piece of wood, *g*, which projects outwards, as shown, and this in its downward motion strikes against the lever, H, which through its connecting-rod, J, and the lever, K, acts on the valve spindle, L, so as to open the steam port, and again admit steam beneath the piston of the cylinder, for the purpose of raising the punch-block for another stroke, the parts being so arranged, that the steam may be admitted to the cylinder when the punch-block has completed its downward stroke. M M are wooden buffers, fixed in the bed, A, on which the punch-block strikes in the event of the resistance of the metal intended to form the nuts being insufficient to withstand the force of the blow; and N N are wooden stops fitted to the entablature, which act as buffers to the punch-block in its upward motion. O O are curved recesses on the punch-block, which act on the levers, P P, of the die-blocks, R R, in its downward motion, and force the dies, Q Q, together, so as to perform the operations of forming and cutting off the nuts at the same time that they are punched by the descending punches. The dies, Q Q, are fixed in the blocks, R R, which are capable of motion in guides, formed on the bed, A. S S are connecting-

rods attached to the blocks, R R, and T T are springs, by means of which the die blocks and dies, R Q, are drawn backward or away from each other when the punch-block is again raised, thereby making room for introducing between them the end of the metal bar, from which the nuts or other articles are to be formed. The levers, P P, are at the same time raised to their diagonal position by means of springs, the ends of which are attached to fixed pins, one of them being in the block, R, and the other in the lever, P. X X are the punches, which are fitted in the punch-holder, Y, the parts of which are held together by bolts and nuts, the whole being bolted to the punch-block, G, by other bolts. The upper ends of the punches fit into the box or hollow part, Z, of the

Fig. 4.

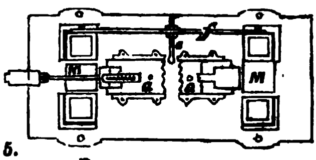


Fig. 5.

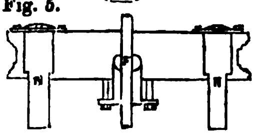
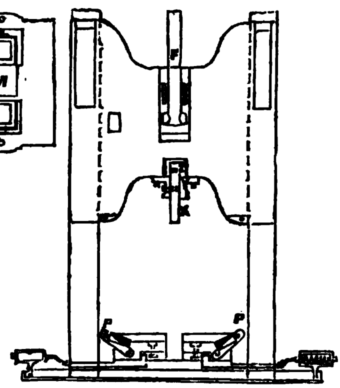


Fig. 3.



punch-holder, which enters a recess formed in the punch-block, and this box contains lead and pieces of steel, against which the punches bear, the lead yielding to the punches in the event of an irregular resistance of the metal under operation. A clearing bar, with springs for throwing from the punches any nuts that might be carried up by them, is provided. *e* is a guide or stop, against which the end of the bar of metal under operation abuts; this guide or stop is carried by a flexible bar, *f*, which is adjusted so as to bring the stop, *e*, to any desired position by means of nuts moving upon it.

The action of the machine will be readily understood from the foregoing description. The metal from which the nuts or other articles are to be formed is worked in a heated state; it might also be wrought cold, but not with such advantage.

MATHEMATICAL INVESTIGATION OF THE CENTRIFUGAL PUMP.

We have much pleasure in publishing the following able letter of a correspondent to whom we are already indebted for several valuable contributions. It is not surprising that an important subject, which has but recently been brought practically before mechanical men, should excite lengthy and serious discussion; indeed it is very necessary that it should, and for this reason we willingly insert "J. C.'s" letter, which we believe will tend very materially to elucidate the true theoretical aspect of the centrifugal pump question.

To the Editor of the Mechanics' Magazine.

Sir,—I wish, with your permission, to direct the attention of your readers to an article published in No. 1608 of your Journal, professing to be the general mathematical investigation of the action of the centrifugal pump. I read this article with considerable interest, as I had never before seen any attempt to solve the dynamical problem involved in this subject; but I was much disappointed to find, that while the author pretends to discuss the case in which there is a flow of water through the tube, all his equations correspond to that in which the water has no velocity in relation to the arm, or in which there is no delivery. That this is an important defect I need not point out; all I propose to do is to show that it exists, and endeavour, so far as I can, to correct it: the former is extremely easy; the latter somewhat difficult.

At page 507 the author says, "Since the

element at P revolves in a circle of which the radius is S P, the centrifugal force is represented by

$$\frac{a^2}{g} r \frac{ds}{d\theta}."$$

Here we see that the first expression for the centrifugal force is taken for the case when the element, P, moves in a circle; that is, when it has no motion through the tube; and this is integrated for the whole of the fluid contained in the arm. I had a difficulty in comprehending this process of integration, which I will point out; here is the expression:

$$\frac{a^2}{g}\int_{R_1}^{R_2} r\frac{dr}{d\theta} = \frac{a^2}{2g}(R_2^2 - R_1^2).$$

Now, I think most mathematicians would be at a loss to make *that* mean anything very intelligible. The proper expression for the elemental force in the case discussed is not

$$\frac{a^2}{g}\ r\ \frac{ds}{d\theta};\text{ but }\frac{a^2}{g} r\,ds,$$

and this, resolved in the direction of the curve, is

$$\frac{a^2}{g} r\,ds\,.\,\frac{dr}{ds}.$$

Since $\frac{dr}{ds}$ is the cosine of the angle which the tangent to the curve makes with the radius vector; hence, the whole of the centrifugal forces impelling the fluid in the direction of the tube are represented by

$$\frac{a^2}{g}\int_{R_1}^{R_2} r\,dr = \frac{a^2}{2g}(R_2^2 - R_1^2).$$

The same result as that given by Mr. Robertson.

This force, in the case now under notice, would be equal to the excess of the pressure of the atmosphere at the extremity of the arm, above the pressure of the fluid at the junction of the arm with the suction-pipe; and since the fluid in the suction-pipe is at rest, this excess is equal to the weight of the fluid column in the suction-pipe; hence, if W be written for the weight of this column, we have

$$\frac{a^2}{g}(R_2^2 - R_1^2) = W,$$

from this a may be found without difficulty. Thus much for the case in which there is no flow.

Let us now notice those important particulars, in which the case of motion through the pipe differs from this. In the first place, the particles do not move in circles, nor in curves anything like circles. Of this Mr. Robertson seems perfectly aware, as he investigates the form which the arm must have in order that the actual path of the fluid may be a straight line; but the immediate consequence of it he certainly ignores; viz., that the forces which impel the said particles through the pipe cannot be estimated as if their motion were circular. This seems to me a very glaring error, and the investigation for the straight path makes it especially so; it is certainly strange to estimate the centrifugal force of a particle of matter, which moves in a right line, as

$$\frac{a^2}{g} r \frac{ds}{d\theta}.$$

But there is another very important change in the conditions of the problem when a flow is going on through the arm. When the fluid is at rest the pressure at the top of the suction-pipe is, as we have said, equal to the pressure of the atmosphere, minus that due to the column in the suction-pipe; but when motion takes place, the pressure at that position will grow less as the velocity increases, and actually equals nothing when the velocity is that at which the fluid would flow from the upper extremity of the suction pipe into a vacuum, if it were free to do so. This pressure is determinable for each particular value of the velocity.

I propose, if you, Sir, will indulge me with space, to attempt to settle the following questions:

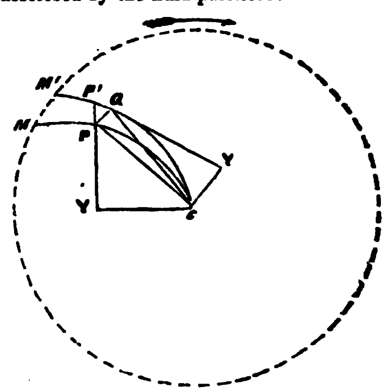
I. What is the equation to the path of the fluid particles?

II. What are the velocity and the moving forces on each particle at each point in its progress?

III. What is the effective moving force on the whole fluid in the arm in the direction of the pipe?

IV. What are the impressed forces on the same fluid in the same direction?

I. To discover the equation to the curve described by the fluid particles:



Let CPM and CP'M' be two consecutive

positions of the arm of the pump; P and P′ two such positions of a particle of fluid; PQ a small arc of a circle about C; PY′ a tangent to the curve described by P; P′Y a tangent to the arm at the point P′; then these tangents may be supposed to coincide with their respective curves for the small arcs PP′, P′Q; and PP′Q may be treated as a right-lined triangle; and the angles CPQ and CQP may be regarded as right angles.

Assume CY $=p$; CY′ $=p'$; CP $=r$; length of the arm from C to P $=s$; distance described by P $=s'$; $\angle$ P′PQ $=\phi$; $\angle$ P′QP $=\theta$.

$$\text{Whence } \cos.\ \theta=\frac{p}{r},\ \cos.\ \phi=\frac{p'}{r}.$$

$$\text{And } \frac{PQ}{P'Q}=\frac{\sin.\ (\theta+\phi)}{\sin.\ \phi}.$$

Hence, assuming the velocity through the tube $=v$; the angular velocity of the arm $=a$; $t=$ the time; we have, since PQ $=a\,r\,dt$, P′Q $=v\,dt'$

$$\frac{a\,r}{v}\sin.\ \phi=\sin.\ \theta\cos.\ \phi+\cos.\ \theta\sin.\ \phi;\ \text{or}$$

$$\frac{a\,r^2}{v}\sqrt{r^2-p'^2}=p'\sqrt{r^2-p^2}+p\sqrt{r^2-p'^2}\quad\text{(I.)}$$

If the equation to the curve of the arm be given

$$p=f(r)\ .\ .\ .\ .\ .\ .\ .\ .\ .\ \text{(II.)}$$

We may eliminate p from (I.) and (II.) and so discover the path of the fluid particle by determining the $=^n$ $p'=f'\ (r)$.

To illustrate this we may suppose the arm to be straight, or $p=0$.

So that $=^n$ (I.) becomes

$$\frac{a\,r^2}{v}\sqrt{r^2-p'^2}=p'r,$$

$$\text{or } \frac{a}{v}=\frac{p'}{r\sqrt{r^2-p'^2}}=\frac{d\theta}{dr},$$

so that $r=\frac{v}{a}\theta$ would be the equation to the path in common polar co-ordinates, supposing θ and r to vanish together. This curve is the spiral of Archimedes.

Again, if the equation to the required path of the fluid be given,

$$p'=f'\ (r)\ .\ .\ .\ .\ .\ .\ \text{(III.)}$$

We may eliminate p' between (I.) and (III.), and so obtain

$$p=f(r)$$

the equation to the curve, in the form of which the arm of the pump must be constructed, in order that the particles of the fluid may describe the *given curve*. As an example of this we will suppose the path given, to be a straight line, so that $p'=0$, when (I.) becomes

$$\frac{a}{v}=\frac{p}{r^2};$$

$$\text{but } \frac{p}{r^2}\quad\frac{1}{\sqrt{r^2+\frac{dr^2}{d\theta^2}}}.$$

$$\text{Hence, } \frac{d\theta}{dr}=\frac{1}{\sqrt{\frac{v^2}{a^2}-r^2}}.$$

$$\text{and } \theta=\sin.^{-1}\frac{ar}{v},$$

$$\text{or } r=\frac{v}{a}\sin.\ \theta.$$

The same as that given by Mr. Robertson.

II. What are the velocity and moving forces on the particle P?

From the triangle PP′Q we have

$$PP'^2=P'Q^2+PQ^2-2\,P'Q.PQ\cos.\theta;$$

but PP′ $=ds'$ P′Q $=vdt$ PQ $=ardt$

$$\cos.\ \theta=\frac{p}{r};$$

$$\therefore \frac{ds'^2}{dt^2}=v^2+a^2r^2-2\,avp.$$

So the absolute velocity of the particle is,

$$\frac{ds}{dt}=\sqrt{v^2+a^2r^2-2avp}\quad .\ .\ \text{(IV.)}$$

Again, by the laws of mechanics, the moving forces on the said particle are, $\frac{1}{g}.\frac{d^2s'}{dt^2}.ds$, in the direction of the tangent to its path, and $\frac{1}{gr}\ \frac{ds'^2}{dt^2}.\frac{dp'}{dr}.ds$ in the direction of the normal to the same curve, since $r\frac{dr}{dp}=$ radius of curvature; but from equation (IV.) we have

$$\frac{1}{g}.\frac{d^2s'}{dt^2}ds=\frac{a}{g}.\frac{r\frac{dr}{dt}-v\frac{dp}{dt}}{(v^2+a^2r^2-2avp)^{\frac{1}{2}}}ds,$$

$$\text{and, }\frac{1}{gr}.\frac{ds'^2}{dt^2}.\frac{dp'}{dr}.ds=\frac{1}{gr}\left\{r^2+a^2v^2-2\,a\,v\,p\right\}\frac{dp'}{dr}.ds.$$

III. Next resolving these in the directions of the tangent, and the normal to the pipe at P, we find *that* in the direction of the pipe equal to

$$\left\{ \text{M}\cdot \cos. \text{PP}'\text{Q} - \text{N}\cdot \sin. \text{PP}'\text{Q} \right\} ds,$$

writing M for $\frac{1}{g} \frac{d^2 s'}{dt^2}$

and N for $\frac{1}{gr} \frac{ds'^2}{dt^2} \frac{dp'}{dr}$;

but $\sin. \text{PP}'\text{Q} = \frac{ar}{v} \sin. \text{P}'\text{PQ}$

$$= \frac{ar}{v} \frac{\sqrt{r^2-p'^2}}{r} = \frac{a}{v} \sqrt{r^2-p'^2},$$

$$\cos. \text{PP}'\text{Q} = \sqrt{\frac{1-a^2(r^2-p'^2)}{v^2}} = \frac{\sqrt{v^2-a^2r^2-a^2p'^2}}{v}.$$

Hence the elemental force in the direction of the pipe is

$$\left\{ \frac{\text{M}}{v} \sqrt{v^2-a^2r^2+a^2p'^2} - \frac{\text{N}}{v} a\sqrt{r^2-p'^2} \right\} ds,$$

$$= \frac{1}{v} \left\{ \text{M} \sqrt{v^2-a^2r^2+a^2p'^2} - \text{N}a \sqrt{r^2-p'^2} \right\} \frac{ds}{dr} dr,$$

$$= \frac{r}{v\sqrt{r^2-p^2}} \left\{ \text{M}\sqrt{v^2-a^2r^2+a^2p'^2} - \text{N}a\sqrt{r^2-p'^2} \right\} dr.$$

This expression integrated between the limits R_1 and R_2 gives the whole moving force on the fluid in the arm, in the direction of that arm. It is integrable enough if we know the equation either to the form of the arm, or to the path of the fluid; but without either of these it is not to be integrated as it cannot be expressed in terms of r only. One conclusion we can come to is, that this force *is not independent* of the form of the arm, as is the centrifugal force when the fluid is at rest in relation to the pipe.

IV. The impressed forces in the direction of the arm are the atmospheric pressure at its outer end, tending to retard the flow; and the pressure of the fluid at the junction of the arm and suction-pipe tending to accelerate it. The former is already known; the latter must be determined in terms of the velocity v.

Taking the ordinary equation for fluid motion when the velocity at any point is independent of the time

$$\frac{1}{2}v^2 + \frac{1}{\rho}p = gz + \text{C};$$

and making $z=h$ the height of the column in the suction pipe, when $p=\pi$ the pressure of the atmosphere; we get

$$-\frac{1}{2}v^2 + \frac{1}{\rho}(\pi - p) = g(h-z).$$

Now make $z=0$, and we have

$$-\frac{1}{2}v^2 + \frac{1}{\rho}\pi - \frac{1}{\rho}p = gh$$

$$p = \pi - \rho gh - \frac{\rho}{2}v^2.$$

Hence the resultant of the impressed forces in the direction of the pipe is the retarding force

$$\pi - \left\{ \pi - \rho gh - \frac{\rho}{2}v^2 \right\}$$

$$= \rho gh + \frac{\rho}{2}v^2.$$

This, by the principle of D'Alembert, must be in equilibrium with a force equal and opposite to the effective moving force in the same direction. We may here observe that a pump of this kind will evidently not work if v be not less than the velocity at which the fluid would flow freely from the top of the suction pipe into a vacuum; and that it will not work at any velocity unless h be less than the height of that column whose weight would balance the atmospheric pressure.

What is the best form of curve to be given to the arm is not very easily determined. There does not seem to be any reason that it is the one stated to be such by Mr. Robertson. I am inclined to think that the only conditions of economy are, that the extremity of the arm shall be in a direction at right angles to the radius vector, and that the pump be worked at such a velocity, determined by its form, as would make

$$\frac{ds'}{dt} = 0, \text{ when } v = \text{R}_2:$$

it seems probable that there is such a velocity for every form of arm.

Here, Sir, I must leave the subject for the present, remaining yours, &c., J. C.

Deptford, June 17, 1854.

ON THE STATISTICS OF LIGHT-HOUSES.

BY C. BABBAGE, ESQ.

(Extracted from the Minutes of the General Statistical Congress assembled at Brussels, September, 1853.)

The accompanying Tables have been deduced from the lists of lighthouses published by the Board of Admiralty of Great Britain and the Board of Lighthouses of the United States, for the use of the vessels of their respective countries.

These tables must be considered only as a fair approximation to the true numbers. The small discordances which may be perceived arise from the circumstances that several lighthouses have been removed or have fallen down or been destroyed by hurricanes. On the other hand, several have been built, or may have been rebuilt, or, at the time of printing the lists, had only been proposed to be erected. Again, the lists from which they are taken are not all of the same date, and, for the convenient use of seamen, many are repeated even more than once in the various separate lists.

The discrepancies thus introduced are, however, of small amount, and would, if corrected, have no influence on the inferences deduced in the following remarks.

The great objects of lighthouses are to point out to the sailor positions of danger, to indicate to him the course to be pursued in order to avoid it, and to direct him to positions of safety.

The first quality in a light is:

That it shall be visible at a sufficient distance.

The second qualification is:

That it shall be impossible to mistake one light for another.

Lighthouses may be classed under three heads:

Ocean Lights, or those which are first seen on the arrival of ships from distant voyages. These ought to be most highly luminous.

Danger Lights.—These are to indicate rocks, piers, sand-banks, &c., and to direct the course of the ship in narrow channels.

Harbour and Tidal Lights.—These are to indicate harbours of refuge, and, by pointing out the depth of water at the entrance, and the ebbing or flowing of the tide, to enable the mariner to decide upon the safety of entering them.

These three classes equally require, *as a condition for their utility*, that the mariner shall have easy and rapid means of identifying the light which he sees.

Table I. contains the lighthouses of the world, arranged according to the countries which maintain them. These are classed in thirteen columns, according to their respective qualities.

1. Revolving lights.
2. Double lights.
3. Triple lights.
4. Red lights.
5. Green lights.
6. Blue lights.
7. Bell } sounded in fogs.
8. Gong } sounded in fogs.
9. Whistle } sounded in fogs.
10. Ship lights.
11. Lighted by gas.
12. No. of lighthouses.
13. No. of lights.

There are about 1,500 lighthouse stations, many of which comprise two or three, or more separate lights, so that the number of distinct lights exhibited amounts to about 1,700.

Of these 1,700 lights, about

680	are maintained by Great Britain.
380	„ „ the United States.
200	„ „ France.
1,260	

Sweden and Norway, Russia, Denmark, the Netherlands and Spain together support 347. Amongst the smaller states contributing to the safety of the mariner, Liberia deserves notice as maintaining two lighthouses, one of which is a revolving light.

Table II. contains an analysis of about 260 revolving lights.

The object of revolving lights is partly to distinguish adjacent lights from each other. They have, however, another advantage, namely, that by concentrating the light emitted in one or more portions of the circle they would otherwise illuminate, these lights are seen at a greater distance when those points are opposite the observer. Consequently revolving lights present in succession to all points of the horizon a brighter light than would otherwise be seen from the same lamp.

The revolving lights are arranged in the Table in the order of the times in which they revolve.

The shortest period of revolution is five seconds: there are three which have this duration. The longest period is one of seven minutes: only one light, that of Goa, exhibits this tedious period.

Far too little attention has hitherto been paid to one of the most important qualifica-

tions of lights; namely, their perfect distinction from each other.

This has been so neglected, that in some important channels it has been deemed by good authorities that it would be injurious to increase the number. It is, however, quite obvious that, supposing each light to be *perfectly* distinguished from all others, no multiplication of the number and proximity of lights could ever be disadvantageous to vessels, although the expense of supporting them might render it impolitic to build so many lighthouses.

The prevalence of round numbers in the duration of the rotations of lights is a remarkable fact. Out of about 260 revolving lights,

38	revolve in	0½ minutes.
60	"	1 "
45	"	2 "
30	"	3 "
21	"	4 "
1	"	5 "
3	"	6 "
1	"	7 "
199		

The times of revolution of the remaining 60 are scattered indiscriminately through the various intervals.

Table III. contains the distances at which various lights are seen. These vary from one to thirty-six miles, and from various reasons require revision.

Out of about 1,500 lights there are seen,

135 at 10 miles.
107 at 12 "
137 at 15 "

And on looking over the whole list, there is an evident tendency to find a large number of lights seen at distances indicated by a round number of miles. This is partly impeded by the fact that some of the distances are given in geographical miles, whilst others are measured by the miles of the country to which they belong. It is, however, much to be desired that so important an element in the utility of lights should be submitted to a series of direct experiments.

The number of double lights is about 180. There are 17 triple. The object of such lights is in some cases to distinguish them from adjacent lights; but the more frequent use is as *leading lights* for the entrance of harbours. They most frequently occur on the heads of piers.

There are about 160 lights coloured red. This also is used for distinguishing them from adjacent lights. It may, however, be remarked that a very considerable quantity of light is lost by the use of red glass, and that such lights at great distances lose their peculiar colour. The number of green and blue lights is about 16; they are used for distinction, and are still more destructive of the light which passes through them than the red.

In dense fogs all lights become invisible, even at very short distances. Under such circumstances, bells or gongs are sounded by mechanical means at lighthouses. Great Britain has 13 lighthouses with bells, and 22 with gongs. The United States have 46 bells, but no gongs. It is curious that bells and gongs, which only sound low notes, should be used at the same time that the breakers on the surrounding rocks are producing the same class of notes.

The sea-birds which live amidst storms, and require to communicate with each other, all utter shrill cries. Lately the United States have employed whistles as a substitute. At two lighthouses, Beaver Tail and New London, and also on Bartlett's reef-light ship, they use whistles. In two cases they are moved by horse power. It appears, from the Report presented to Congress by the United States' Lighthouse Board, that one of these whistles is heard at a distance of from 3 to 10 miles.

Upwards of 100 ships are employed as stationary lighthouses, some of which might be dispensed with if lights could be rendered visible at greater distances than they are at present.

Five lighthouses are illuminated by gas. One of these, Portland Harbour, on the south-east shore of Lake Erie, is lighted with natural gas.

On examining this list of the lighthouses of the world, the most remarkable point which presents itself is the want of distinguishing characteristic.

Out of 1,500, not above 400 can be said to have any distinction. This defect has led, and is continually leading to the most calamitous destruction of life and property. A plan founded on some experiments was suggested in 1851, in a chapter of the "Exposition of 1851, or Views of the Industry, the Science, and the Government of England." It consisted simply in causing by mechanical means an opaque cylindrical shade to descend so as momentarily to cover the light, and, rising immediately, it thus caused an occultation and reappearance. By assigning to each lighthouse a particular number, and by causing it to make a corresponding number of occultations, each lighthouse would indicate to distant vessels its own number. After a short pause of bright light it would repeat the same number, and thus continue during the whole night.*

* See *Mech. Mag.*, pp. 315, 363, current volume.

TABLE I.—*The Statistics of Lighthouses for* 1851, *containing Tables of the Lighthouses belonging to each nation, the distances at which they are visible, their times of revolution, &c.* *By* CHARLES BABBAGE.*

	Revolv.	Double.	Triple.	Red.	Green.	Blue.	Bell.	Gong	Whistle	Ship.	Gas.	Nr. of L. Houses.	Nr. of Lights.
Great Britain ..	82	99	11	121	10	4	13	22	"	60	"	552	682
United States ..	39	26	1	10	"	"	46	"	3	38	4	357	381
France	46	18	1	18	1	"	2	"	"	1	"	183	199
Sweden and Norway	18	6	"	2	"	1	5	"	"	1	"	77	83
Russia	12	8	3	3	"	"	5	"	"	8	"	72	85
Denmark	12	7	"	2	"	"	4	"	"	4	"	57	62
Netherlands	3	4	"	2	"	"	"	"	"	"	"	49	54
Spain	16	2	"	1	"	1	"	"	"	"	"	33	35
Naples et Sicily ..	6	3	"	"	"	"	"	"	"	"	"	24	28
Portugal	7	"	"	2	"	"	"	"	"	"	"	15	15
Turkey	"	3	"	"	"	"	"	"	"	"	"	13	16
Roman States ..	3	"	"	"	"	"	"	"	"	"	"	13	13
Prussia	4	3	"	"	"	"	"	"	"	"	1	11	14
Brazil	6	"	"	4	"	"	"	"	"	"	"	11	11
Greece	1	1	"	1	"	"	"	"	"	"	"	6	7
Austria	2	"	"	"	"	"	"	"	"	"	"	6	6
Belgium	"	1	1	"	"	"	"	"	"	"	"	5	9
Sardinia and Islands	3	"	1	"	"	"	"	"	"	"	"	5	7
Turkey	"	2	"	"	"	"	"	"	"	"	"	5	7
Tuscany	2	"	"	1	"	"	"	"	"	"	"	5	5
Banda Orientale..	1	"	"	"	"	"	"	"	"	"	"	3	3
Liberia	1	"	"	"	"	"	"	"	"	"	"	2	2
Venezuela	"	"	"	"	"	"	"	"	"	1	"	1	1
Buenos-Ayres ..	"	"	"	"	"	"	"	"	"	1	"	1	1
Chili	"	"	"	"	"	"	"	"	"	"	"	1	1
Peru	"	"	"	"	"	"	"	"	"	"	"	1	1
	264	183	18	167	11	6	75	22	3	114	5	508	1728

RAILWAY BRAKES.

BY MR. W. B. ADAMS.

(*Concluded from page* 561.)

Dissatisfied with all the brakes he had seen, as not fulfilling the whole of the requisite conditions, viz., first, to convert the carriage into a sledge from a rolling body; secondly, not in any way to interfere with the action of the springs; thirdly, to get the whole of the insistent weight to bear on the sledges; fourthly, not to interfere with the action of the wheels, or in any way to rub the surface of the tyres; and, fifthly, to work in either direction; the writer set himself to work in 1846 to produce a brake corresponding to these requisites. The result was as follows:—The two axle-boxes were connected together on each side by a powerful horizontal bar. The sledges, flanged at the lower side, were connected to the bar by jointed bars, like a parallel ruler. One of these bars is prolonged upwards, and serves for a lever acted on by the rod and bell-

* We have omitted the two remaining Tables, since they would occupy more space than it would be desirable to devote to them. The omission will not be found important, as the preceding remarks of the author contain the chief facts furnished by an analysis of them.

crank, being prevented by a stop from working too far.

This brake fulfilled all the requisite conditions, but it fulfilled the last one—working in either direction—imperfectly. Running in one direction, the action on the rail would tend to keep the sledges up to their work without much strain on the crank. But in working the reverse way, there would be a constant action tending to lift the sledges from the rail.

To remedy this difficulty, the writer, in the year 1851, devised two other plans, both independent of the body, and both calculated for running in either direction. In one plan a bar connects the axle-boxes on each side of the carriage. To this bar are hinged the sledges, eight in number. Each pair of sledges is connected by a cross-bar by an axis at the end, the bars being very strong and increasing to the centre, where a revolving nut is attached to each. Through these nuts are inserted a longitudinal bar, with screw-thrusts on its right and left. As the rod is turned in one direction by means of the ordinary guard's tackle, the sledges approach each other in pairs, and descend upon the rail with more or less pressure, as may be desired. When the bar is turned in the opposite direction the sledges rise.

This arrangement fulfils all the conditions required. It does not in any way interfere with the action of the springs, for the body can rise and fall on the vertical shaft worked by the guard; the wheel-tyres are not touched; the whole of the insistent weight is on the sledges. Under-bearings are provided to the boxes to take the upward pressure when the sledges lift the wheels, and the sledges may either have flanges to them, or stops may be placed to limit the rise.

The other variety of sledge brake produces a similar result, but is various in its action. The two axle-boxes are connected together by a horizontal bar, similarly to the ordinary slide-brake; but the bar is formed into an angle-frame by the descending portions. On these descending portions slide the sledges. When sliding in the downward direction they approach the rail, and in the upward direction they recede from the rail. Two levers are attached by centres to the horizontal bar. The lower ends of these levers are attached to the sledges by slotted forks, working on pins to prevent the rise and fall. The upper ends of the levers are connected to tension-rods, which, when acted on by the lever and screw motion, set the sledges on to the rail. The opposite action lifts the sledges upwards. The levers and the sledges are connected to those on the opposite side by cross bars, and thus all act in unison.

It will be seen that this brake acts with the carriage running in either direction. There is a tendency in the friction on the rail to lift the two forward sledges, but there is a counteracting tendency to keep the two hinder ones to their work, so that the action is balanced. The sledges are not intended to touch the wheels, but they may if preferred; but it would be a disadvantage.

Apart from the question of obtaining retarding friction between the wheel and rail, or sledge and rail, there is another consideration as to the best mode of applying the friction, whether by the agency of the human hand, or by the force of the momentum. If applied by hand, it is essential, at least with passenger trains, that there should be a separate brakesman to every brake. This would involve expense; and for this and other reasons it has often been proposed to make brakes self-acting, and more than once experimentally practised. It is usually accomplished by means of the buffer-rods. When the speed of the engine is checked, the train collapses in length by the sliding in of the buffer-rods. To the ends of the buffer-rods are attached levers which act on the brakes, and bring them in contact with the wheels. But if this be done by rigid movement, without elastic compensation, the result will be a jumping action, endangering breakage and getting off the line.

Now, it is clear, that on the self-acting principle the action of the brakes must depend on the stroke of the buffer-rod; but as this varies with the momentum and weight of the different parts of the train, to get a good adjustment the springs which provide the elastic compensation ought to vary in strength—strongest next the engine, and lessening towards the tail of the train. But it is evident that the practical making up of railway trains will permit of no such nicety.

Supposing that the brakes were only made self-acting with the extreme stroke of the buffer-rod, that could only take place by the sudden retardation of the engine. In such case there does not appear any advantage in self-acting brakes. If the engine had power enough to arrest itself, and cause all the buffer-rods to strike home, the train could not well overrun it, and would not need brakes.

Supposing the springs were made to put the brakes on at the half-stroke of the buffer-rods, there would be the disadvantage of retardation of the train frequently when not required.

It appears, therefore, that the notion of stopping a train rapidly by any self-acting process, is not founded on any sound mechanical principle; and, in case of collision, there would be no advantage in so doing.

MANUFACTURE OF GOLD PENS.

THE gold for pens is rolled into thin strips, about the thirty-second part of an inch in thickness. In this state it is black on the surface, and looks like brass. The first operation is cutting it into stubbs—short pieces pointed and angular at one end, and cut square off at the other; this is done in a die; the stubbs are then run through a machine, and each point is indented for the reception of the real pen points. The next operation is pointing the stubbs. The substance used for points is rhodium, a hard brittle metal like steel, unoxidizable. It is to this metal we wish to direct particular attention.

There are various qualities of it, some worth twelve, twenty, thirty, and forty dollars per ounce, and even 120 dollars have been paid for a superior quality. It is found in the ores of platinum associated with irridium, osmiun, and palladium. Irridium is used by some for the points of gold pens, but rhodium is the dearest and best. All of this metal used in the United States comes from the Peruvian or Russian mines, but we have been assured that there is plenty of it in California. It is also found there pure, associated with sands, and requiring no chemical manipulation for its separation, as in the platina ores of the Ural. Our gold seekers in California should direct their attention to this metal, as it is far more valuable than gold. It is of a white glassy steel colour, and in minute roundish particles, like sand; the round globular particles are the best for pen points; in fact, out of one ounce of this metal perhaps not one-seventieth of the granules can be used; the rest are rejected. A fine particle of rhodium is soldered on the indented point of each stubb of gold. The solder is mostly composed of gold, for, unless it is gold, ink soon corrodes it, and the rhodium point soon drops off. This is the case with poor pens made by indifferent makers.

After the pen is pointed, it is rolled between rollers with indents in them to save the points until the stubb is drawn out to its proper length and correct thickness. The rolling also makes the gold elastic. Many suppose that gold pens can be re-pointed; but such is not the case, for the heat employed to solder on the point renders the gold as elastic as a piece of tin; the heat changes the relative position of the crystals of the metal—thrusts them out, as it were—and the gold requires rolling or hammering afterwards to give it elasticity—the spring so requisite for pens. This is the reason why old pens cannot be re-pointed. Some makers do not hammer their pens after being rolled; they are never so good. After being rolled they are cut to the proper form in a finish die, then stamped with the name of the maker, and afterwards turned up to the rounding quill form. After this the point is slit with a thin copper disc revolving at a great velocity; the great speed makes the soft metal disc cut the hard metal rhodium; the gold is slit with another machine; therefore to make a slit in each pen it has to undergo two operations. The point is next ground on a copper wheel revolving at great velocity. This is a very delicate operation, and a good artist gets high wages. After this the pens are "stoned out," that is, they are ground down on the inside and out by fine Water of Ayr stones, by hand on a bench alongside of a tub of water; the stones are long, thin, roundish slips, and the pens have to be operated so as to make one part more thin than another, to give them the proper spring. They are then polished on swift revolving copper rollers, and afterwards finished with fine powder and soft chamois skin. Thus, to make a gold pen, it undergoes twelve operations. Inferior pens can be made with less labour, but they soon develope their true characteristics.—*Canadian Journal.*

AN ANGLE-MULTISECTOR;

Or an Instrument for Dividing an Angle into Three, Five, Seven, Eleven, Thirteen, Seventeen, Nineteen, and Twenty-three equal parts.

BY. MR. C. J. RECORDON.

To the Editor of the Mechanics' Magazine.

SIR,—Since you published the description of my "Angle Quintsector" (No. 1608, page 515), I have derived from the Trisector other mechanical combinations, which seem to me to be the simplest that can be obtained for the purposes which they serve. For that reason I will indicate their principle; but I shall do so very briefly, in order not to trespass too largely upon your space with remarks upon this instrument, which is certainly more an object of curiosity than of utility.

BCD (fig. 1, next page) is the moveable triangle belonging to the trisector (see No. 1604, page 418); BG is a new piece turning on B, and equal BA. The two pieces, AN and GN are equal, and the point, N, is kept on the prolongation of BC by means of a slot cut along the latter piece. At G, A, and N, are axes. CBQP, ASRB, BGFV, are moveable quadrangles, analogous to ANGB. BM is the prolongation of DB.

Thus we have,

$\angle ABC = 3 \cdot \angle ABE \cdot \ldots\ldots\ldots\ldots (I.)$

$\cdot \angle PBQ = \angle PBC = 4 \cdot \angle ABE$

$\therefore \angle ABQ = \angle ABE + \angle EBQ$

$= 5 \cdot \angle ABE \ldots\ldots\ldots\ldots (II.)$

$\angle NBG = \angle NBA = 3 \cdot \angle ABE$

$\therefore \angle GBE = \angle ABE + \angle ABG$

$= 7 \cdot \angle ABE \ldots\ldots\ldots\ldots (III.)$

and $\angle GBQ = \angle GBE + \angle EBQ$

$= 11 \cdot \angle ABE \ldots\ldots\ldots\ldots (IV.)$

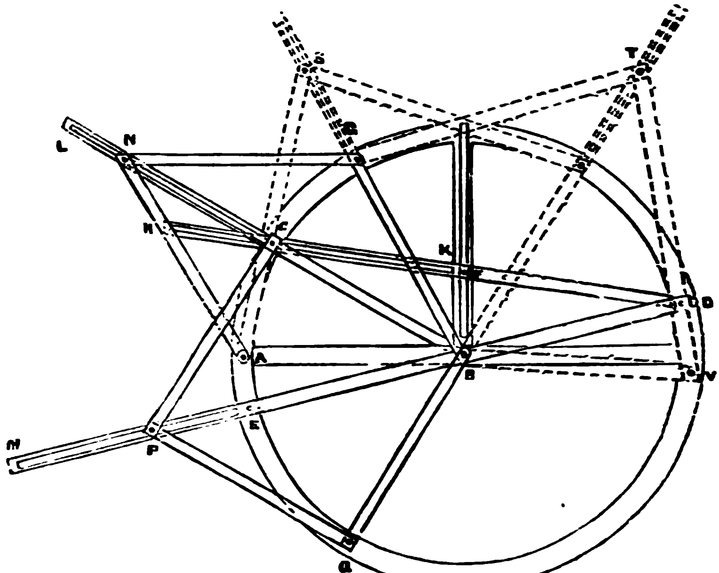
$\angle SBR = \angle SBA = 6 \cdot \angle ABE$

$\therefore \angle RBE = \angle RBA + \angle ABE$

$= 13 \cdot \angle ABE \ldots\ldots\ldots\ldots (V.)$

and $\angle RBQ = \angle RBE + \angle EBQ$

Fig. 1.



$= 17 \cdot \angle ABE \ldots\ldots\ldots\ldots (VI.)$

$\angle TBV = \angle TBG = 6 \angle ABE$

$\therefore \angle VBE = \angle VBG + \angle GBE$

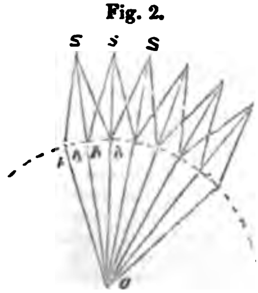
$= 19 \cdot \angle ABE \ldots\ldots\ldots\ldots (VII.)$

and $\angle VBQ = \angle VBE + \angle EBQ$

$= 23 \cdot \angle ABE \ldots\ldots\ldots\ldots (VIII.)$

Whatever limits the different angles may have, the instrument can be applied in all cases to any given angle, if this is previously properly divided.

Fig. 2.



Scholium.—Fig. 2 illustrates a general principle for finding any rational fraction of an angle, OS being the diagonals, and OA equal sides of quadrangles of the kind described. The angles made by adjacent lines, OS, OA, are all equal.

Corollary.—Beside the mentioned multiples of $\angle ABE$, there are the following additional ones to be found on the instrument for a similar use.

$\angle BDF = 2 \cdot \angle ABE.$
$\angle EBC = 4 \cdot \angle ABE.$
$\angle ABG = 6 \cdot \angle ABE.$
$\angle CBQ = 8 \cdot \angle ABE.$
$\angle CBR = 9 \cdot \angle ABE.$
$\angle ABR = 12 \cdot \angle ABE.$
$\angle VBC = 15 \cdot \angle ABE.$
$\angle VBA = 18 \cdot \angle ABE.$

The instrument effects therefore no less than *sixteen* divisions of angles, and can also be employed to find at once fractions of angles composed of two of the numbers, indicating these sections as [illegible], [illegible], [illegible], [illegible], &c., &c.

SCREW FOR PLANKING SHIPS.

The annexed engraving is a side elevation of a tool named a "Self-Holding Plank Screw," for which a patent was granted to Solon Staples, of Topsham, Me.,

on the 20th of last December. When using this machine in planking ships, the screw, G, is inserted into the proper timber, and the jointed lever, I H, which has a serrated face on its knob end, acts as a brace on the timber. This is done before the plank to be worked is taken from the steam-box. When the plank is set to be operated by the

screw, the eye-plate, E, on the foot of screw, C, rests upon it, and by turning said screw by the lever, R, it works down through the screw-collar, D, and forces the plank, against which E abuts, with great power into its proper place. The ring-plate, E, of the screw, C, is connected by link and eye, P and M, to the stock, A, of the tool, and the collar, D, is made in the shoulder, B, of the stock.

The patentee says of this instrument: "It has combined in it the ring-bolt, rein-staff and rope, cleat, set-bolt, and most of the wedges. Two men, with the use of these machines, will work a hot plank to its proper place in half the time that four will with rein-staffs. With this machine the workmen have comparatively nothing in their way on the stage. The safety of workmen on and under the stages, when planking with these machines, is much greater. For sealing, where great power is needed, and timbers are compact, so that it is difficult working the plank where it is intended to go, this machine works well. Also for bringing the butts of stubborn planks to their proper places, planking round sterns, holding quarter-pieces, channels, house-sills, comings, hooks, &c., until they are fastened. I believe this self-holding plank-screw to be the most time-saving and the safest machine ever used for planking."—*Scientific American.*

DISASTROUS BOILER EXPLOSION.

On Friday morning, about three o'clock, the inhabitants of Smethwick, near Birmingham, were startled from their sleep by a tremendous explosion, which shook many of the houses as if by an earthquake, and was heard a mile or two off. Many persons rushed into the streets, and the intelligence spread with wonderful rapidity that one of the boilers at Messrs. Beasley and Farmer's District Ironworks had exploded with most disastrous effect, it is to be feared to life, and most certainly to property. The cause of this devastation appears to be somewhat involved in mystery. The ponderous machinery with which the works are studded, in the shape of rolling-mills, lathes, grinding-shops, &c., was driven by an engine of 65-horse power. Steam was supplied from two boilers, situated in the very centre of the premises, and surrounded on all sides by forges, workshops, and mills. These were attended by William Dunn, the assistant engineer, during the night; and part of the machinery having got out of order, he stopped the engine for the purpose of putting it in repair. He had returned from doing so, and had just again put the engine in motion, when one of the boilers exploded with such force as to place the lives of very many of the workmen in danger. Streams of scalding water were dashed off to incredible distances, thousands of bricks were sent whirling off 300 or 400 yards, striking houses, where they have left marks as if they had been battered by artillery; roofs were torn off, the tall chimney-stack shaken, so that some 14 or 16 feet toppled down from the top on the premises below, and falling walls and the shrieks of scalded men and boys made up a scene which an eye-witness described as the most terrible he had ever seen. When the steam and clouds of dust had cleared away some idea of the extent of the damage was ascertained. Two men and four boys who had been engaged on the bank near the boiler were found lying in a frightful state. They were terribly scalded and otherwise injured. In other parts of the works men were struck down by the showers of flying bricks, others by the falling of the walls and roofs, others again still less seriously hurt by being knocked down by the force of the concussion. One of the boiler pipes, which had been blown in an oblique direction, completely demolished a brick lathe-room in its course, and finally struck an iron boat on the adjoining canal, which it sank. One part of the boiler, weighing several cwt., was found in a field about 100 yards off, where it fell without doing any damage. The boiler itself, however, was the cause of great mischief. It

seems to have risen from its brick bed some 10 or 15 feet, and to have been propelled to the opposite side of the yard. In its course it first demolished a forge—walls, roof, and everything; then entered a rolling-mill, the wall and roof of which it cut through as if they had been paper, shattering everything in its way, and at last came to the ground above some rolls. Some idea may be formed of the immense force of the explosion, when we state that this part of the boiler, which was originally 25 feet long and 10 feet in diameter, must weigh between five and six tons. Great as the damage was on this side, on the other it was scarcely less. A gun-barrel and spectacle-grinding shop was shattered, a puddling furnace completely uprooted and overturned, and a rolling-mill considerably damaged. It is impossible to convey an idea of the wreck. On a rough calculation, the injury sustained will amount to at least 2,000*l.* Unfortunately, however, there is every reason to apprehend that the casualty will be attended by fatal results. * * * * * * The only wonder is, that the occurrence was not fatal to many. There were about 150 persons employed in the establishment at the time, but the greater part had left about an hour before the explosion took place. With respect to the cause of the explosion, there are, of course, several theories afloat. Some consider it arose from a deficiency of water in the boiler, and others from a pressure of steam. This, however, will no doubt form the subject of inquiry; but we may mention that it was a tubular boiler, which had been in work for about eleven years, although it had been examined so recently as Whitsun week, when it was found to be quite safe. It was the ends which gave way. The great mass of the body of the boiler is still entire.—*Birmingham Journal.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Certain applications of vulcanized India-rubber.* (A communication.) Patent dated December 1, 1853. (No. 2799.)

This invention consists in the application of vulcanized India-rubber to the manufacture of curry-combs, brushes of all kinds, and artificial cloth. The caoutchouc is mixed with a composition of sulphur and oxyde of zinc, and formed into a sheet, which is then moulded by suitable moulds into the form required.

REILLY, JAMES, of Thomas-street, Manchester, Lancaster, chair manufacturer. *Improvements in machinery or apparatus for tenoning, mortising, and sawing wood, metal, or other materials.* Patent dated December 2, 1853. (No. 2800.)

This invention consists in constructing a frame or material, the cutters, planes, or centre parts of which work with a quick vertical motion in slides or slots. The material to be operated upon rests upon a moveable table, upon which is fixed a fence or block, against which the material is held at any required angle by means of bolts and thumb-screws.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *Improvements in blocks for ships and other uses.* (A communication.) Patent dated December 2, 1853. (No. 2802.)

This invention consists—1. In the employment of strengthening rods which pass through the cheeks of the blocks in directions transverse to the fibres of the wood; and, 2. In the use of supporting-rods applied to the pins of the sheaves.

DEACON, HENRY, of Widnes, Lancaster, manufacturing chemist, and EDMOND LEYLAND, of St. Helen's, same county, builder. *Improvements in apparatus for the manufacture or production of sulphuric acid.* Patent dated December 2, 1853. (No. 2803.)

Claims.—1. The use of sulphur as an ingredient in the cement used in forming sulphuric acid chambers or vessels. 2. The use of natural or artificial stones or mineral matters in the erection and construction of sulphuric acid chambers or vessels in which the formation and condensation, &c., of sulphuric acid is effected.

BROWN, ALEXANDER, of Glasgow, Lanark, cask manufacturer. *Improvements in metallic casks and other vessels.* Patent dated December 2, 1853. (No. 2804.)

Claims.—1. A mode of constructing metallic casks and other vessels in separate halves, formed with flanges, for the purpose of joining them together, and with a lip or ring flange projecting beyond the flange of one of the halves, and fitting within the other half. 2. The use in metallic casks, constructed as before described, of a ring of India-rubber, or other elastic material, as a packing for the joint of the cask. 3. The adaptation of a packing-ring to the covers of such casks.

WILLIAMSON, GEORGE, of Glasgow, Lanark, manufacturer. *Improvements in applying motive power.* Patent dated December 2, 1853. (No. 2805.)

Claims.—1. Communicating the reciprocating motion of a pendulum by means of a connecting-rod and crank to a revolving shaft. 2. A mode of transmitting the power of prime movers through a chronometrical escapement. 3. The application

and use of chronometrical or clock escapement movements for communicating motive power to separate or detached machinery.

WILSON, JOHN CHARLES, of Bedford Flax Factory, Thornton, Kirkcaldy, North Britain. *Improvements in machinery for scutching flax, hemp, and other fibrous materials.* Patent dated December 2, 1853. (No. 2807.)

These improvements relate to a former patent, and one part of them consists in placing the knives or beaters of the machinery described in the specification of the previous patent at an inclination to the axis, so that each knife or beater will come into action gradually, and the succeeding one will commence at opposite ends of the cylinder. A second improvement consists in indenting the edges of such knives or beaters, so that they may penetrate amongst the fibres. And a third improvement consists in making the rest or resist-plate moveable and adjustable, and in mounting several machines upon a common shaft, and in using such improvements with the common holding-rollers and clamp-holders.

COLLIER, GEORGE, of Halifax, York, mechanic. *Certain improvements in looms for weaving.* Patent dated December 2, 1853. (No. 2808.)

This invention relates to looms for weaving terry and cut pile fabrics, and consists in placing the terry warps on one beam, and in applying two rollers or rods that divide the warp, so that one-half of the warp passes over one roller or rod and through one of the leaves of the heddles, and the other half passes over the other roller or rod and through another leaf of heddles, the rollers or rods being weighted. The practical effect of this arrangement is the same as if the terry warps were on two different beams.

LISTER, SAMUEL C., of Bradford, York, manufacturer. *Improvements in combing wool, hair, cotton, and other fibrous materials.* Patent dated December 2, 1853. (No. 2810.)

This invention consists in filling combs with fibrous material, and in working the material at the same time. An oscillating arms travels in the segment of a circle, and at the extremity of this arm is fixed a comb, porcupine card, or other pointed surface: when the arm is extended on one side, it receives fibrous material from a carding-engine or other feeder, and when it is extended in the opposite direction, it places this material on to a stationary or travelling-comb.

BESSEMER, HENRY, of Baxter House, Old St. Pancras-road, Middlesex, engineer. *Improvements in the manufacture and refining of sugar.* Patent dated December 2, 1853. (No. 2811.)

This invention applies to small crystal sugar, and consists mainly in a method of increasing the size and purity of the raw sugar crystals by performing the solution and re-crystallization of them without the intermediate process of evaporation.

SAUNDERS, JONATHAN, of St. John's-wood, Middlesex. *Improvements in the manufacture of rails for railways.* Patent dated December 2, 1853. (No. 2812.)

This invention consists in a peculiar method of piling iron and steel, and of rolling the piled material into railway-bars, so as to obtain iron rails faced with steel wearing surfaces.

BUCK, CHARLES, of Wellington, Somersetshire, gentleman. *An improved apparatus for retarding or stopping the progress of wheeled carriages.* Patent dated December 3, 1853. (No. 2815.)

On each side of a carriage and immediately in front of the wheels (the hind wheels, if there are four) are placed two self-acting breaks, forced against the periphery of the wheels by a spring when the vehicle is at rest, but connected with the shafts or fore carriage of the vehicle in such manner that when the horses draw upon the latter the breaks are withdrawn from the wheels.

DRAY, WILLIAM, of Swan-lane, London, agricultural implement maker. *Improvements in the construction of portable houses and buildings.* Patent dated December 3, 1853. (No. 2816.)

This invention consists in constructing buildings with frames formed of angle-iron, and panelling of boards which have grooved edges into which thin iron tongues are inserted.

GWYNNE, JOHN, and JAMES EGLESON ANDERSON GWYNNE, of Essex-wharf, Strand, Middlesex. *Improvements in the manufacture of fuel, its preparation and applications for the reduction of ores, fusing and refining metals, cementation or making steel, and treating salts.* (Partly a communication.) Patent dated December 3, 1853. (No. 2817.)

This invention mainly consists in preparing peat by pressing out or otherwise withdrawing the moisture from it, and by then cutting it up into portions of a suitable size by means of cylinders between which it is passed.

CHEAVIN, SQUIER, of Spalding, Lincoln, plumber and glazier. *A double action or belt filterer.* Patent dated December 5, 1853. (No. 2820.)

Within an outer vessel, which may be of any required shape, size, or material, the inventor places two or more perforated bottoms resting upon rims or rests fixed to the outer vessels, and a cylinder of such a size as to admit of layers of gravel, charcoal, and other filtering substances

being put all round between it and the sides of the outer vessel. The sides of this cylinder are perforated, in order that the water may pass into and through these layers, and a sponge or bag of felt is placed on the top of the cylinder.

MUIR, MATTHEW ANDREW, of Glasgow, Lanark, machinist. *Improvements in check and fancy weaving.* Patent dated December 5, 1853. (No. 2823.)

The primary claims are, a mode of transmitting the power for shifting the shuttle drop box of looms for weaving checks and similar patterns, through the jacquard barrel and cards; and a mode of producing the pattern in check and fancy weaving, by the action of a jacquard barrel and cards upon pins of different lengths arranged to move the drop box shifter to different extents and in opposite directions.

PATTERSON, JOHN, of Beverley, York, engineer. *Improvements in reaping machines.* Patent dated December 5, 1853. (No. 2824.)

Claims.—1. The use in reaping machines of a fixed or stationary cutter or cutters having the cutting edge jagged or serrated. 2. The use of reciprocating fingers or gatherers, for collecting the grain and pressing it against the cutter or cutters. 3. The use of reciprocating angular fingers or gatherers in combination with a fixed or stationary cutter or cutters having the cutting edge jagged or serrated.

STOREY, THOMAS, of the Phœnix Foundry, Lancaster, engineer. *Improvements in the construction and arrangement of apparatus employed in connection with sewers.* Patent dated December 5, 1853. (No. 2825.)

This invention consists in employing for sewers a cast-iron or other metallic manhole cover of any suitable shape, divided into compartments, into each of which blocks of wood, stone, or other material are placed.

ROBERTSON, JAMES, of Kentish Town, Middlesex, cooper. *Improvements in the consumption or prevention of smoke.* Patent dated December 5, 1853. (No. 2826.)

This invention consists in placing either all or partially around the furnace or fire-containing chamber a series of air-admitting apertures, so as to allow the air to act directly from different sides upon the burning fuel. The inventor also proposes to use, in connection with this, a suitable apparatus by which the entire body or any part of the furnace may be let down upon a new supply of fuel being introduced, so as to allow the level of the top of the fuel to be always in the same position with regard to the grating or apertures.

OLDFIELD, EDWARD, of the firm of Oddy, Robinson, and Co., of Salford, Lancaster, machine makers. *Improvements in machinery for spinning and doubling.* Patent dated December 6, 1853. (No. 2828.)

Claim.—Driving any convenient number of spindles by the same band, to which motion is given by grooved pulleys fixed on a horizontal shaft.

HADDAN, JOHN COOPE, of Chelsea, Middlesex, civil engineer. *Improvements in the manufacture of cartridges and of wads or wadding for fire-arms.* Patent dated December 6, 1853. (No. 2829.)

This invention relates, first, to cartridges which are intended to burst or to be opened in the muzzle of the gun (being formed with a weak part or parts for that purpose), and consists mainly in making one of the edges of the material of which they are formed with scollops, gores, or projections, so that when these are bent down they may become the tail end of the cartridge. The invention relates, secondly, to cartridges which are intended to be burst or opened at or near the breech of the gun by the action of the ramrod, and consists in several improvements, of which the primary is that of strengthening the tail edge of the cases of such cartridges, so that when they are forced down into the barrel of a gun, which is adapted in any way to arrest their progress at a suitable position, the strengthened tail edges, being the parts first arrested, shall offer a suitable resistance for ensuring the bursting of the weak portions of the cartridges when they are rammed home. The invention relates, thirdly, to wads which afford a seat of a somewhat conical shape for the projectile, and consists in forming them of fluid pulp or water leaf in moulds arranged so that two or more may be formed at once.

BELLFORD, AUGUSTE EDOUARD LORADOUX, of Castle-street, London. *The manufacture of an artificial tartaric acid, and the application of the same to useful purposes.* (A communication.) Patent dated December 6, 1853. (No. 2831.)

Claims.—1. Converting oxalic acid into tartaric acid by disoxygenation, either by means of sugar or any other substance which has an affinity for oxygen. 2. Manufacturing tartaric acid by producing at once oxalic acid less oxygenated and in a less complete state of crystallization than the common one. 3. Using as a dyeing mordant for any colours the liquors remaining after washing the crystals obtained by either of the above processes, and after having been suitably concentrated.

ROSS, GEORGE, and JAMES INGLIS, of Arbroath, North Britain, factory managers. *Improvements in looms.* Patent dated December 6, 1853. (No. 2832.)

The fly-wheel (or other convenient part of the loom) at each rotation is made to act

on one end of a cranked lever, the other end of which is connected with and gives motion to a toothed rack. The amount of motion given to the rack is regulated by means of a lever or arm resting at one end on the surface of the decreasing diameter of the warp beam, to which the action is thus accommodated.

GAINE, WILLIAM EDWARD, of Harewood-street, Harewood-square. *An improvement in treating or preparing paper.* Patent dated December 6, 1853. (No. 2834.)

This invention consists in immersing paper in sulphuric acid, or in applying such acid to paper, the latter being subsequently washed.

WITTY, ROBERT CHRISTOPHER, of Portland-place, Wandsworth-road, Surrey, engineer. *Improvements in the construction of boiler and other furnaces.* Patent dated December 6, 1853. (No. 2835.)

The inventor constructs a furnace with a perforated bridge at the end of the fire bars, and a slide door, or other convenient arrangement, for closing the opening above the bridge.

JOHNSON, JOHN HENRY, of Lincoln's-inn-fields, Middlesex, gentleman. *Improvements in printing oil-cloths and other fabrics.* (A communication.) Patent dated December 6, 1853. (No. 2836.)

This invention consists in providing a series of suitable moveable sections of wood, metal, or other material, and so arranging them together in forms or cases, that they shall collectively constitute blocks or patterns, from which various ornamental figures in one or more colours may be printed upon oil-cloths, carpets, &c., and from these sections fac simile electrotype plates or casts may be taken in metal or other suitable material, these being also employed for printing.

BERNARD, JULIAN, of Regent-street, Middlesex, gentleman. *Improvements in machinery or apparatus for stitching or uniting and ornamenting various materials.* Patent dated December 6, 1853. (No. 2837.)

Claims.—1. The use of a rotatory arm or bracket working round a fixed centre on a bed-plate, for carrying a needle and a portion of the needle-actuating mechanism, whereby the arm and needle may be brought to different positions on the bed-plate for effecting different varieties of stitching. 2. The use of a revolving or sliding bedplate for the purpose of bringing different kinds of mechanism under the needle to effect different varieties of stitching. 3. The combination in one machine of various kinds of mechanism, parts of which are specially arranged according to the particular form of stitch required, and work in conjunction with one needle slide or carrier. 4. The use of clutches or friction discs and straps for throwing in or out of gear, and for regulating or stopping entirely the various moving parts of sewing machines. 5. A mode of actuating the needle by means of a chain or cord and spring through a circular hollow arm. 6. A mode of driving sewing machines by means of a weight or spring. 7. A mode of regulating the speed or action of such machines. 8. The use of rods fitted with small pullies or wheels pressing upon the surface of the material to be sewn, and guiding its course, and keeping the seam in a state of tension.

NEWTON, ALFRED VINCENT, of Chancery-lane, mechanical draughtsman. *Improvements in fire-arms and ordnance.* (A communication.) Patent dated December 6, 1853. (No. 2839.)

This invention consists in combining with the rear and open end or breech of the barrel of cannon and small arms a hinged breech plate, by the turning of which the bore of the barrel will be opened to receive the charge.

SLATER, WILLIAM and ROBERT HALLIWELL, both of Bolton-le-Moors, Lancaster, foremen. *Improvements in machinery for spinning.* Patent dated December 7, 1853. (No. 2840.)

This invention consists mainly in connecting the carriages of the machines for spinning, known as "Potter's low-headstock self-acting mules," by a bridge or rail attached to the end of each carriage and reaching either over or under the headstock, and in casting or otherwise fixing together the cam by which the backing off and winding on catch-boxes and the fallers are actuated and the large wheel by which the carriage is taken up.

BATES, LEWIS HARVEY, of Bradford, York, engineer. *Improvements im machinery for stamping and cutting metal nuts and other similar metal articles.* Patent dated December 7, 1853. (No. 2841.)

A full description of this invention forms the first article of this Number.

ADAMS, WILLIAM BRIDGES, of Adam-street, Adelphi, Middlesex, engineer. *Improvements in railway wheels, their axles and boxes.* Patent dated December 8, 1853. (No. 2845.)

One mode of carrying out this invention in relation to railway wheels consists in constructing these with a disc body of timber, formed of wedge-shaped pieces dowelled or tongue-and-grooved together and turned down in a lathe, so that the wheel is thinner at its edge than at its centre.

HENLEY, WILLIAM THOMAS, of St. John-street-road, electrical engineer. *Improvements in electric telegraphs.* Patent dated December 8, 1853. (No. 2846.)

Claims.—1. Constructing magneto-electric machines, with armatures revolving or moving within the poles of the magnet or magnets; also constructing the magneto-machines with a lever and cams or rollers for detaching the armatures from the magnets, or moving the armature and the magneto-machines, together with a reversing apparatus. 2. The use of a short circuit, established at pleasure, for diverting the current from the line circuit in working telegraphs, instead of making and breaking contact between the said line circuit and the generator of the electric current. 3. A mode of numbering the wires in an electric rope or cable by the introduction of a tape or yarn or other material, or by painting or colouring one side of the rope; or other such means, by which, on looking at any part of the cable, each separate wire can be known, without the necessity of marking the wires separately. 4. The use of two magnetic needles fixed in the same plane or nearly so, on an axle, and actuated by an electro magnet, or coils of wire excited by an electric current, for the purpose of giving signals or discharging alarums; and also the use of horse-shoe or curved magnets for partially neutralising the inductive effect of the magnetic needles on the soft iron of the coils, and for overcoming and regulating the residual magnetism in the soft iron produced by powerful currents, or from atmospheric or subterraneous currents of electricity; and also a method of counteracting the effect of the permanent magnets in the machine on the magnetic needle by the use of a plate or piece of soft iron placed between the magnet and the needles. 5. A method of moving the style or marking apparatus in the recording telegraph in parallel lines over the paper or other suitable stationary material, and also a mode of marking the chemical paper by the passage of electricity from the magneto-electric machine given off by impulses by moving a handle or lever. 6. The use of a fixed armature surrounded by coils of wire, to be used in conjunction with an electro-magnet, for obtaining the induced currents for transmission through insulated wire, whether such currents are produced by simply making and breaking the battery current, or by reversing it, either by mechanical means or by the action of the current itself; also a mode of reversing the alternate induced currents so as to transmit any number of them in succession in one and the same direction through the line circuit, and to change the direction at pleasure, whether such induced currents are produced by means of a battery or by the magneto-electric machine with reciprocating action.

Solomons, Benjamin, of Albemarle-street, Piccadilly, Middlesex, optician. *Improvements in telescopes and other glasses in their application to the measurement of distance.* Patent dated December 8, 1853. (No. 2848.)

This invention consists in so disposing a series of wires in the field of the instrument as to enable an observer to judge (approximately) the distance of the object viewed.

Robinson, Joseph, of Denton Mill, Carlisle. *Improvements in mills for grinding corn and other substances.* Patent dated December 8, 1853. (No. 2851.)

This invention consists in constructing separate chambers for each pair of stones, and in mounting each pair of stones within their enclosed chamber on a hollow pedestal or support fixed to the foundation.

Beall, James, of Effingham-place, Cheshunt, Herts. *Improvements in apparatus for applying sand to the rails of railways.* Patent dated December 8, 1853. (No. 2853.)

A full description of this invention was given at page 56 of this Volume.

Newton, William Edward, of Chancery-lane, Middlesex, civil engineer. *Improved machinery for drilling or boring rocks and other hard substances.* (A communication.) Patent dated December 8, 1853. (No. 2854.)

The principal working parts of this machinery, such as those connected with the drill or borer, are mounted in a swinging frame supported on centres, so that they may be inclined, and the drill made to work at any required angle to the horizon.

Ruttre, Jean Baptiste Edouard, manufacturer, of Paris, France. *Improvements in machines for producing shoddy from woven fabrics and for sorting the fibres of fibrous materials.* Patent dated December 9, 1853. (No. 2858.)

Claims.—1. The application of steam, either alone or mixed with other vapours (and at such degrees of heat and moisture as may be found most suitable), to rags or other woven fabrics, for the purpose of reducing them to a fibrous state, in such manner that the steam acts on the fabrics just before or at the moment they are seized by the feeding rollers, and during their passage from these to the picking cylinder. 2. An arrangement for giving a variable pressure to the feeding rollers of rag-picking machines. 3. The application of centrifugal force in rag-picking machines for the purpose of separating from the parts of the rags, or other woven materials that have been reduced to a fibrous state, those parts which have not been sufficiently reduced to the fibrous state; and also the application of centrifugal force to the sorting or separating of the fibres according to their weight.

FOUQUE, PIERRE MARIE, civil engineer, LOUIS RÉNÉ HÉBERT, and VINCENT ETIENNE DORET LE MARNEUR, of Paris, France. *Improvements in rudders.* Patent dated December 9, 1853. (No. 2859.)

This invention consists in constructing the rudders patented October 21, 1853, by the same patentees, so that they may be applied to any part of the exterior of the vessel.

JAMES, ARTHUR, of Redditch, Worcester, manufacturer. *Improvements in counting, measuring, and weighing needles, and in preparing papers to receive them.* Patent dated December 9, 1853. (No. 2860.)

This invention mainly consists in counting determined or uniform quantities of needles by transferring them from one portion of a plane to another, by means of a rotating wheel or disc, having on its periphery teeth which gather the needles between them, during its rotation on the plane.

CHRISTIE, DUNCAN, and JOHN CULLEN, both of Bromley High-street, Bromley, Middlesex, engineers. *An atmospheric counterbalance slide-valve for the steam engine, hydraulic, and all other machines in which the slide-valve is used or required.* Patent dated December 9, 1853. (No. 2861.)

The inventors describe an arrangement of parts by which a valve is allowed to lift when steam condenses in the cylinder, and is forced back into its place when the water has escaped. Modifications of this arrangement are applicable to hydraulic and other engines.

SHANKS, ANDREW, engineer, of Robert-street, Adelphi, Westminster, Middlesex. *Improvements in instruments and apparatus for indicating or measuring weights and pressures.* Patent dated December 9, 1853. (No. 2862.)

Claim.—"The application of flattened flexible bulbs or discs, made of any suitable material, having mercury, alcohol, or any other fluid intervening, which fluid is forced up a vertical, or horizontal, or spiral glass column, attached so as to indicate the weight, pressure, or dynamometric force."

*** No. 2842 has not yet been allowed. The documents of 2877 are still with the law officers under objection. An extension of the time allowed for filing the final specification of No. 2464, (an abstract of the provisional specification of which was published page 452, No. 1605), has been granted by the Lord Chancellor, and the specification has been subsequently filed.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

JONES, ALFRED ISAAC, of New Oxford-street, London. *An improved cigar-light.* Application dated December 1, 1853. (No. 2795.)

This cigar-light consists of a thin piece of wire or other similar material, which may be stuck into the cigar for the purpose of lighting it, and upon which is placed ignitible matter, composed of cotton or other wool, scented with gum Benjamin and cascarilla, and tipped with a composition of phosphorus, nitre, or other such substance. The phosphorus end is to be rubbed or struck, and the wire-piece is then inserted in the cigar.

HOLLINSWORTH, THOMAS, and JOHN HOLLINSWORTH, both of Winwick, near Warrington, Lancaster, engineers. *Certain improvements applicable to "alarm whistles" to be used upon railways, or as signals where otherwise required.* Application dated December 1, 1853. (No. 2797.)

This invention consists in an application of highly-compressed air, &c., to signalizing.

CALLEN, ARTHUR WELLINGTON, of Peckham, Surrey. *An improved excavating and dredging machine.* (A communication.) Application dated December 2, 1853. (No. 2801.)

The excavator described in this specification consists of a long beam, at the end of which is fixed a strong iron scoop or bucket, the back end of which opens upon hinges, so as to discharge the material excavated, and which closes by its own weight. When closed, the end is held secure by strong iron catches and drop-bolts.

BAIN, ALEXANDER, of Paddington, Middlesex, engineer. *An apparatus for damping paper or other substance, in order to prepare the same for the reception of labels, stamps, and other like articles coated with a gummy or adhesive matter.* Application dated December 2, 1853. (No. 2806.)

This apparatus consists of an air-tight case containing a spongy substance, a fluid, and a piston, and covered at one end with cloth, through which the piston expresses the damping fluid.

REYBURN, ROBERT, of Baker-street, Greenock. *Improvements in sugar-refining.* Application dated December 2, 1853, (No. 2809.)

This invention consists in so arranging the refining apparatus that the portion of charcoal which is most exhausted (that is, that which is nearest to the point where the syrup enters) may be, from time to time, removed, and that fresh charcoal may be added at the end where the syrup escapes, so as to supply the place of that which has been withdrawn, by which means the syrups are to be at all times obtained, as free from colour as at the commencement of the operation.

GREEN, CHARLES EDMUND, of Blandford-street, Portman-square, London, merchant, and JOHN BAYLISS, of Parliament-street, Westminster, civil engineer. *Improvements in machinery to save persons and property in case of fire, which machinery may also be applied for the purpose of raising and lowering weights of any kind, also for the purpose of compression, and for other useful purposes.* Application dated December 3, 1853. (No. 2813.)

This invention consists in arranging a series of screws telescopically one within the other.

ROGERS, ABRAHAM, coal-proprietor and miner, Bradford, Yorkshire. *Improvements in ventilating sewers, mines, or other subterranean works.* Application dated December 3, 1853. (No. 2814.)

The inventor proposes to construct over coke ovens an archway which shall extend between the chimney-shaft and the sewer, mine, or other place to be ventilated, and to connect the mouths of the ovens, by means of a tube or pipe with that place, so as to obtain a constant draught of air to pass through the oven to facilitate combustion and ventilation.

ILIFFE, HENRY JEREMIAH, and JAMES NEWMAN, of Birmingham, Warwick, manufacturers. *Certain improvements in the construction of metallic bridges and other similar structures.* Application dated December 3, 1853. (No. 2818.)

This invention consists in employing metallic tubes, wherever it is practicable, in the construction of the structures mentioned.

SKILLMAN, BENJAMIN, of Crosby-hall-chambers, London, mining agent. *An improved mode of preparing sheets of paper suitable for postal communication.* Application dated December 5, 1853. (No. 2821.)

This invention consists in the *well-known* method of cutting sheets of paper with a lappet formed on one-half, for the purpose of giving the sheets, when folded, the appearance of envelopes.

SIMONS, WILLIAM, of Glasgow, Lanark, ship-builder. *Improvements in propelling and steering vessels.* Application dated December 5, 1853. (No. 2822.)

This invention consists in fitting a screw-propeller abaft a single stern-post, and in forming the rudder larger than usual, and with a space cut in the fore part of it in which the propeller works.

LAVENDER, EDWARD, of Deptford, Kent, general trader. *Improvements in apparatus for subjecting substances to the action of heat for the purpose of carbonizing, calcining, or combining such substances, or for subjecting such substances to the process of distillation.* Application dated December 5, 1853. (No. 2827.)

The inventor mounts a cylindrical or conical retort upon suitable bearings, a portion of its length being within or passing through a furnace, flue, or other heating apparatus. The retort has passing through the centre of it, in a longitudinal direction, a shaft furnished with a screw, or portions of screw-blades, by means of which the materials contained in the retort may be mixed together or stirred, so as to subject them more uniformly to the action of the heat.

MILLS, THOMAS, of Leicester. *An improvement in the manufacture of lined gloves.* Application dated December 6, 1853. (No. 2833.)

This invention consists in using for the lining of gloves a cotton fabric, woven in a shuttle-loom, and having the surface on one or both sides of it raised with a nap or pile.

HARGRAVE, JOHN, of Kirkstall, York, worsted manufacturer. *Certain improved apparatus for washing and scouring wool.* Application dated December 6, 1853. (No. 2838.)

This apparatus consists of several pairs of heavily weighted rollers placed inside a cistern containing soap, lees, or other scouring liquor, and of an endless sheet passing round each upper and under roller alternately, for the purpose of carrying the wool forward between the rollers, and delivering it by suitable machinery upon an endless apron, from which it may be passed to the next machine.

GETTY, JOHN, of Liverpool, Lancaster, ship-builder. *Improvements applicable to the plating of iron ships, part of which improvements is also applicable to the construction of boilers.* Application dated December 7, 1853. (No. 2843.)

This invention relates, *Firstly.* To certain means for facilitating the marking of the holes required to be punched in the plates of iron ships; and *Secondly.* To a mode of determining the curve required for plates intended to fit those parts of the vessel where (as at the head and stern) a sharp bend in her lines occurs.

REEVE, WILLIAM GEORGE, of Elizabeth-street, Eaton-square, Middlesex, veterinary surgeon. *An appendage to horse-shoes, to supersede the necessity of roughing them, as hitherto practised.* Application dated December 8, 1853. (No. 2844.)

The inventor proposes to attach roughed plates to horse-shoes by means of transverse bars fitted to the inner surfaces of the shoes.

MORAN, THOMAS, of Dublin, druggist. *An improved means or apparatus for the prevention of accidents on railways in certain*

cases. Application dated December 8, 1853. (No. 2847.)

This invention consists in applying to the last carriage or van in a train an apparatus, which may be lowered down upon the rails and made to receive the blow of an engine overtaking the carriage to which it is applied; or which may, in other cases, be made to operate as a break.

JAY, WILLIAM CHICKALL, Regent-street, Middlesex. *An improved cloak.* Application dated December 8, 1853. (No. 2849.)

This invention consists in so forming and arranging cloaks as to admit of certain parts of them being varied at the pleasure of the wearer, so as to have the appearance of a cloak or mantle, with sleeves or without sleeves, and of a circular or shawl cloak.

GODDARD, JOSEPH, and CHARLES YATES, both of Tottenham-court-road. *Certain improvements in machinery or apparatus for obtaining and applying motive power.* Application dated December 8, 1853. (No. 2850.)

This invention consists in constructing machinery or apparatus by which a current of air or gas directed towards a space heated by a furnace or fire is collected in a coiled tube having a bell-shaped orifice, and conveyed through it so as to impinge upon a series of blades or fans placed obliquely and at opposite inclinations on the periphery of a drum revolving within an air-tight case furnished with passages through which the current of air may enter.

NELSON, JOHN, of Selby, York, and DAVID BOYD, of the same place. *Improvements in scutching flax and hemp.* Application dated December 8, 1853. (No. 2852.)

In carrying out this invention, a suitable holder is placed so as to bring the flax or hemp between two wheels, each having five or other convenient number of beaters, to which are attached knives or blades. The beaters of the two wheels succeed each other in their action, so that the two sides of the flax or hemp are alternately beaten and acted on by the knives or blades on the respective beaters.

BORDONE, PHILIPPE JOSEPH TOUSSAINT, medical doctor, of Paris. *Improvements in extracting and treating the juice of beetroot and other vegetables.* Application dated December 8, 1853. (No. 2855.)

In carrying out this invention, the substance to be operated upon is placed (either in the form of fresh pulp, or previously dried and reduced to small pieces) into an upright cylindrical vessel, having hemispherical ends, of which the bottom one is perforated, and provided with a lining or filter of woollen stuff, similar to those used in working presses for the purpose of preventing the fermentation of the juices. Steam is then admitted, and the saccharine particles dissolve and flow out of the bottom.

LAVERDET, MARCEL GUSTAVE, of Paris, France, artist. *An improved mode of treating photographic pictures.* Application dated December 8, 1853. (No. 2856.)

In carrying out this invention, which relates to the colouring of photographs, the inventor renders the photograph transparent (if it is not already so) by coating the back with varnish, and causing it to penetrate the pores of the fabric containing the picture. When the varnish is dry, he proceeds with the colouring process, using by preference oil colours, which are to be laid on the back of the picture, so as to imitate as closely as possible the natural tint of the object represented.

MURGATROYD, BENJAMIN, of Bradford, York, dyer. *Improvements in washing or scouring wool and fabrics composed entirely or partly of that material.* Application dated December 8, 1853. (No. 2857.)

This invention consists in the employment of potash in combination with saponaceous substances for the purposes named in the title.

WINSPAR, JOHN, of Liverpool, Lancaster, civil engineer. *An improved mode of coating metals, wood, stone, and plaster, to preserve them from decay.* Application dated December 8, 1853. (No. 2864.)

The inventor coats the metallic or other surface with a varnish composed of vegetable or mineral gum reduced to a liquid by any suitable solvent, and while the coat ing is moist he applies to it, by means of a blast of air, powdered Roman cement combined or not (according to circumstances) with calcined oyster shells or other like preparation of lime.

PROVISIONAL PROTECTIONS.

Dated March 23, 1854.

686. Moses Poole, of Avenue-road, Regent's-park, Middlesex, gentleman. Improvements in preventing alterations of bank-notes, cheques, and other documents. A communication.

Dated March 29, 1854.

724. Frederick William Harrison and Henry Graham William Wagstaff, of Pollard's-row, Bethnal-green, Middlesex, candle-manufacturers. An improvement in the construction of wicks for candles.

Dated April 5, 1854.

782. James Howden, of Glasgow, Lanark, engineer. Improvements in the manufacture of rivets, bolts, spikes, screw-blanks, and similar articles.

Dated April 11, 1854.

846. James Childs, of Belmont, Vauxhall, Surrey. An improvement in subjecting fatty and oily matters, and matter containing oils or fats, to pressure.

Dated May 2, 1854.

980. William Hutton, of Portland-town, St. John's-wood, Middlesex, builder. An improved machine for the manufacture of bricks.

Dated May 24, 1854.

1158. Joseph Lillie, of Manchester, engineer. Improvements in looms for weaving.

Dated May 29, 1854.

1183. John Stevenson, of Graslees, near Elsdon, Northumberland, farmer. Improvements in ploughs.

1185. Henry Kraut, of Zurich, Switzerland, engineer. Certain apparatus applicable to cocks, taps, and valves.

1187. Charles James Pownall, of Kensington, Middlesex, gentleman. An improvement in communicating intelligence from one part of a railway train to another.

Dated May 30, 1854.

1191. Joseph Ridsdale, of the Minories, London, brass-founder. Improved means or methods of communicating between different parts of ships and other vessels.

1195. Edouard Heinhold, of Paris, France. Improvements in diurnal and nocturnal indicating apparatus.

1197. Michael Scott, of Great George-street, Westminster, civil engineer. Improvements in joining or connecting pipes.

1199. Leopold Wertheimber, of Paris, France, physician. Improvements in apparatus for preventing sea-sickness.

1201. Edward Loysel, of Rue de Grétry, Paris, France, civil engineer. Improvements in grinding or pulverizing vegetable substances, and in obtaining infusions or extracts from tea.

Dated June 1, 1854.

1212. David Duncan, of Oak Foundry, Crofton, York. Improvements in railway points or switches and crossings.

1214. John Arrowsmith, of Bilston, Stafford, engineer. Improvements in steam boilers.

1216. Walter Westrup, of Old Ford, Middlesex, mill-engineer. Improvements in the manufacture of wheat into flour.

1218. Stephan Schwabe, of Manchester, Lancaster. Making sulphate of soda or Glauber's salts. A communication.

1220. Owen Rowland, of Lloyd-square, Middlesex, gentleman. An improved apparatus for damping papers, labels, and other like articles.

Dated June 2, 1854.

1222. Thomas Greenshields, of George-street, Derby. Improvements in railway chairs.

1224. Benjamin O'Neale Stratford, Earl of Aldborough, of Stratford Lodge, Wicklow, Ireland. Improvements in locomotion on land and water, part or parts of which are applicable to the raising of weights and the working of machinery.

1226. Moses Poole, of the Avenue-road, Regent's park, Middlesex. An improvement in cop-tubes for mule and other spindles, and machinery for making such cop-tubes. A communication.

1228. Isaac Taylor, of Stanford Rivers, Essex, gentleman. An improvement in producing thin metallic shells adapted to printing.

1230. William Wilkinson, of Nottingham, frame-work-knitter. Improvements in stamping, raising, or printing patterns upon leather, textile, thread, cut pile, or other similar fabrics, and also for dressing textile, cut pile, and other similar fabrics, previous to the stamping and printing.

Dated June 3, 1854.

1232. Peter Armand Lecomte de Fontainemoreau, of South-street, London. Improvements in the construction of umbrellas and parasols. A communication.

1234. Peter Armand Lecomte de Fontainemoreau, of South-street, London. Improvements in producing a useful substitute for leather in various applications. A communication.

1238. John Samuel Foretier, of Carlton-hill, Middlesex, gentleman. Improvements in railway breaks, and in machinery connected therewith. A communication.

1240. Antoine Chavanes, of Rupert-street, Haymarket, Middlesex. Improvements in apparatus for indicating the time a public carriage is, and is not, engaged for hire. A communication.

Dated June 5, 1854.

1242. James Bowman Lindsay, of Dundee, Forfar, teacher. A mode of transmitting telegraphic messages by means of electricity through and across a body or bodies of water.

1244. Walter Crum, of Thornliebank, Renfrew, bleacher and calico-printer, and Peter Stewart, of Thornliebank, mechanical engineer. Improvements in machinery and apparatus for beetling or finishing woven fabrics.

1246. Hippolyte Bordier, of Orleans, France, banker. Improvements in the manufacture of alcoho.. A communication.

1248. Edward Maniere, of Bedford-row, Middlesex, gentleman. Improvements in getting peat, and in manufacturing peat with other matters into fuel. A communication.

1252. Somerville Scott Alison, doctor of medicine, of Park-street, Grosvenor-square. The manufacture of a new material to be used for external applications in medicine.

Dated June 6, 1854.

1254. William Thomas Parkes, of Aston-juxta-Birmingham, Warwick, manufacturer. An improvement or improvements in the manufacture of the ornamental parts of gas fittings.

1256. David Atkinson, of Seaham Harbour, Durham, printer. Improvements in printing, and in the machinery or apparatus to be employed therein or connected therewith.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June 20th,* 1854.)

313. François Vouillon. A new process of protecting the silvering of looking-glasses. A communication.

329. Joseph Johnson. Improvements in apparatus to be used for the preservation of life at sea.

334. Armand Jean Baptiste Louis Marcescheau. Improvements in locomotive engines. Partly a communication from Charles Baron de Berchtold, of Vienna.

337. John Jennings the younger. Improvements in brakes for railway and other carriages.

342. William Brown. Improvements in printing machinery.

363. John Potter. An improvement or improvements in machinery for preparing, spinning, and twisting cotton or other fibrous substances, applicable also to machinery for winding threads or yarns of the same.

364. William Asbury. An improvement or improvements in forks for agricultural and other purposes.

404. Thomas Towers. Certain improvements in marking boards used in connection with billiard and bagatelle-tables for registering and indicating the number of games played.